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THE FAR EASTERN REVIEW

Engineering
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遠東時報

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Contents

THE MINES OF THE ORIENT
THE FURUKAWA MINING PROPERTIES

AUSTRALIAN RAILWAYS

CANTON-AMOY RAILWAY
CANTON-MACAO RAILWAY
YUNNAN RAILWAY PROJECTS
GENERAL RAILWAY NEWS

SHIPBUILDING
THE LAUNCH OF THE U.S.A. T. "MERRITT"
LAUNCH OF THE C.M.S. "KIANG-WAH"
LAUNCH OF THE CHINESE CRUISER "FEI-HUNG"

BUILDINGS
HONGKONG UNIVERSITY
HONGKONG LAW COURTS

FILIPINO LABOR IN THE MINING INDUSTRY

MINING NEWS

ELECTRIC LIGHT AND POWER PLANTS

OSCILLATED AND VIBRATED CONCRETE
BY E. BRUCE-BALL

HSIUNG HSI-LING
CHINA'S MINISTER OF FINANCE

CEMENT NOTES
WIRELESS, TELEGRAPHS AND TELEPHONES

PUBLIC WORKS
HARBOR WORKS
ROADS AND BRIDGES
INDUSTRIAL PLANTS
ETC., ETC.

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Hongkong and Shanghai Banking Corporation

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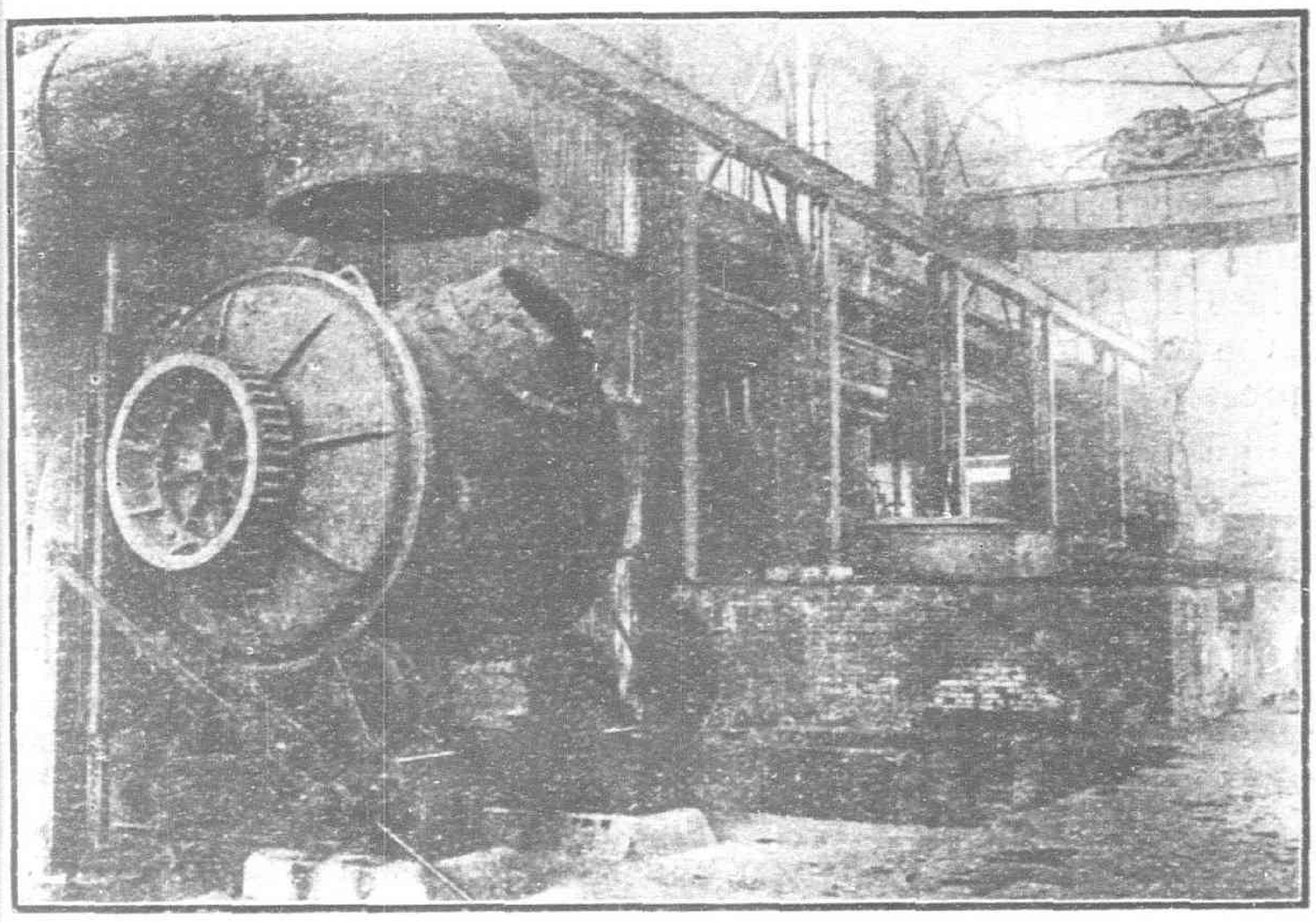
COMMERCE :-: ENGINEERING :-: FINANCE

VOL. IX. SHANGHAI AND MANILA, JUNE, 1912 No. 1.

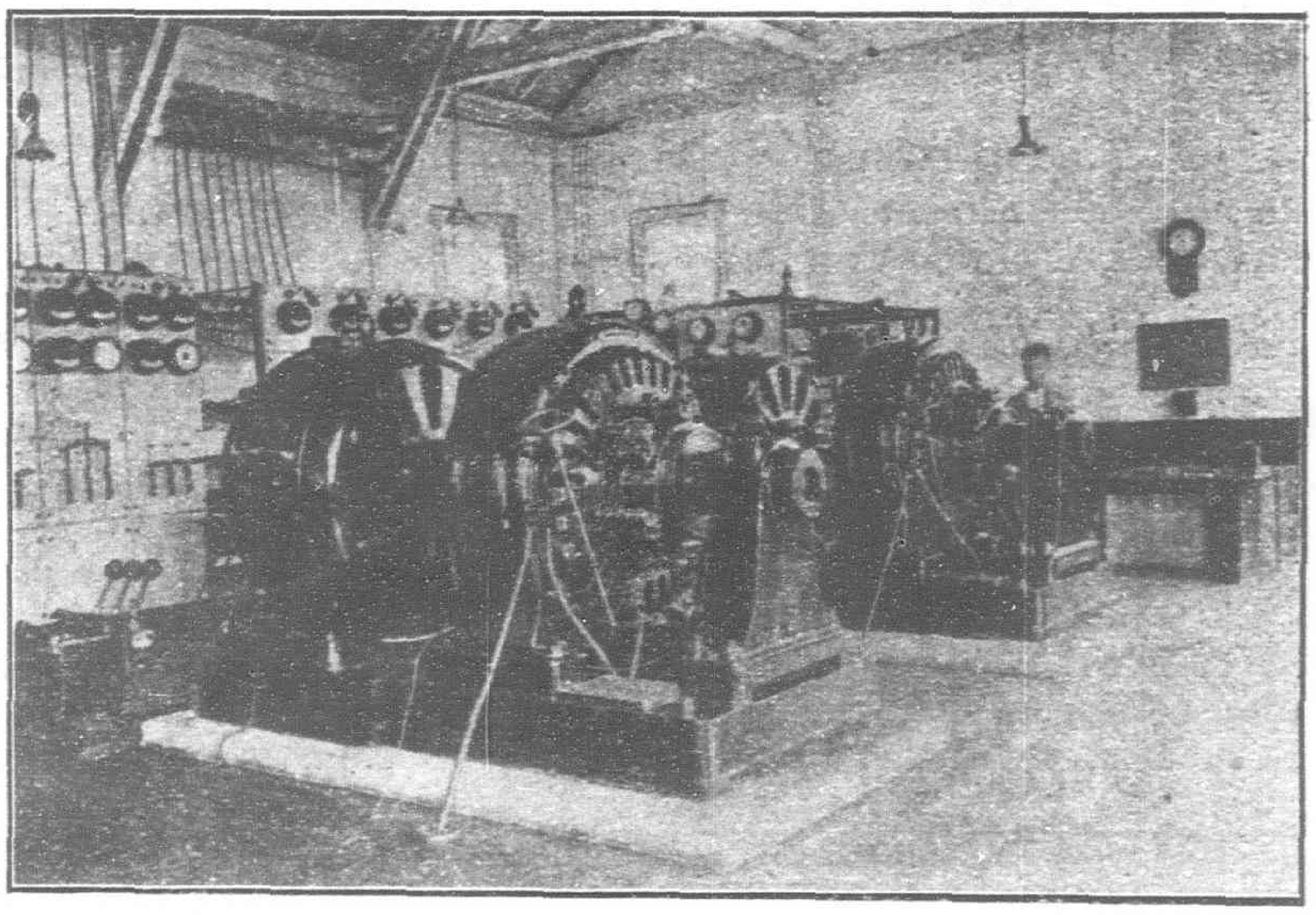
THE MINES OF THE ORIENT

*THE FURUKAWA MINING COMPANY

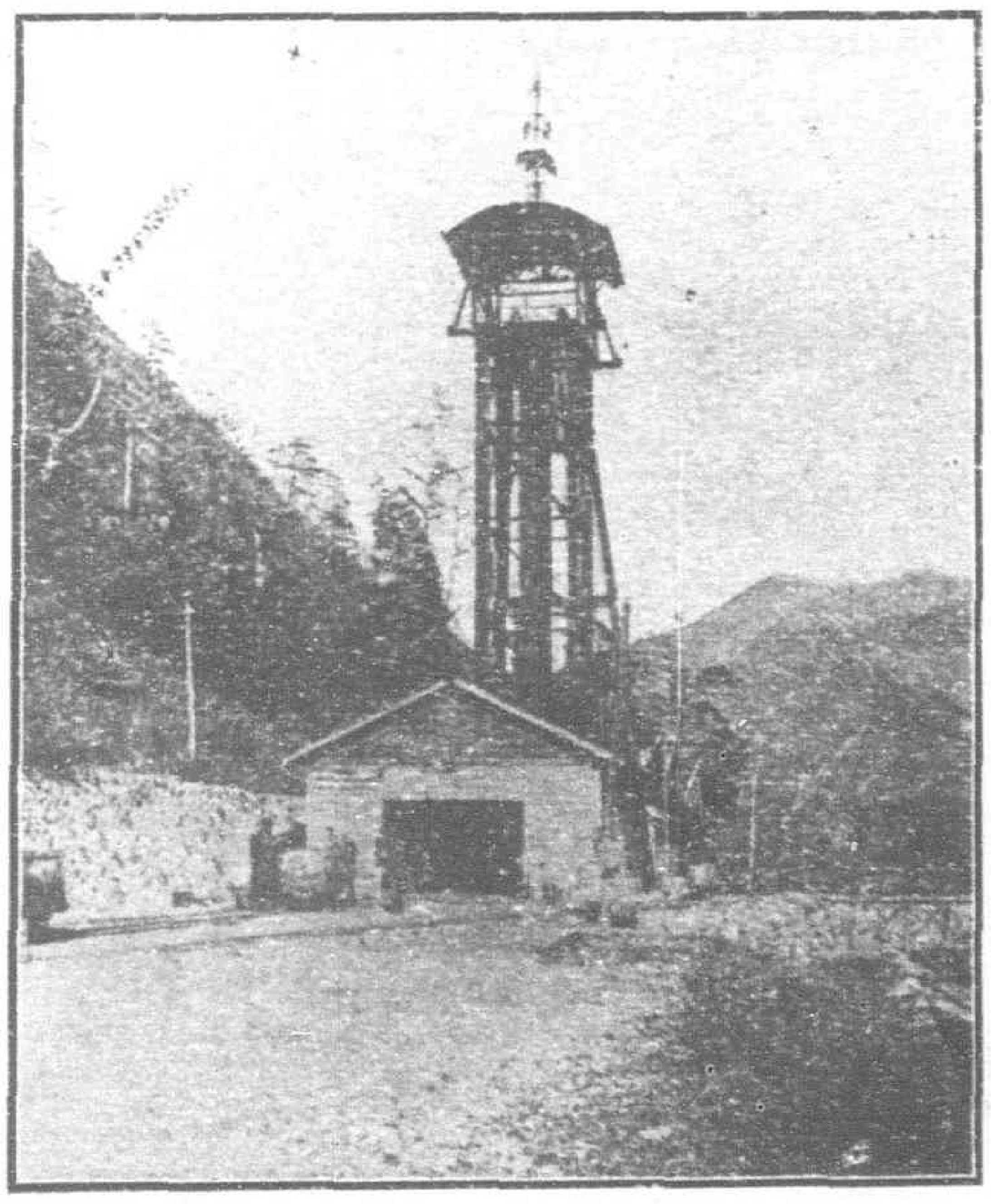
The present Furukawa Kogyo Kaisha (Furukawa Mining Co.) was formerly known by the name of Furukawa Kogyo Jimusho (Furukawa Mining Office) having been founded by the late Mr. Ichibei Furukawa, who first engaged in the mining business by purchasing the Kusakura Copper Mine, Niigata Prefecture, in 1875. The business conditions having proved very favourable, Mr. Furukawa was enabled to invest the profits gained from the mine in purchasing two other mines, the Yabusa Copper Mine, in Fukushima Prefecture, and the Kujurobata Silver Mine, in Niigata Prefecture, and opened the way for future development. The business of the firm was greatly expanded afterward by the incorporation of several other mines such as the Copper mine of Ashio, Tochigi Prefecture, in 1877, the Innai Silver mine, Akita Prefecture in 1884, and the Ani Mine, Akita Prefecture in 1885. Mr. Ichibei Furukawa became a millionaire by his successful mining enterprises, and was known as the mining king of Japan. He died in 1905 leaving his vast property to his son and heir Mr. Junkichi Furukawa. The latter succeeded to the business of his father, consisting of sixty-nine mining concessions with an area of over 20,000 acres of mines of various description such as copper, silver, and coal. In order to extend the sphere of business as well as to place the foundation of the concern on a firmer basis, the organization was converted in 1905, into a judicial person under its present name. Mr. Junkichi Furukawa himself became president of the Company and appointed Mr. Kei Hara to superintend the whole management. Afterward when Mr. Hara accepted the post of Cabinet Minister and retired from business, Mr. Chohichi Kimura, a member of the firm was appointed to succeed him. When Mr. Junkichi Furukawa died some years after, his younger brother and heir Mr. Toranosuke Furukawa succeeded him as president of the Company.



COPPER CONVERTOR, ASHIO



MOTOR GENERATORS IN MUKUMATO SUB-STATION



HEAD GEAR, SHINNASHI SHAFT, ASHIO

The capital of the Company is Yen 5,000,000 wholly paid-up and the principal business of the company is mining, with the electrical metallurgy of copper and the manufacture of coke as subsidiary business. We shall give below the summarized account of both respectively.

The mines owned by the company are distributed all over the country,

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*From Official Reports.

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+F22
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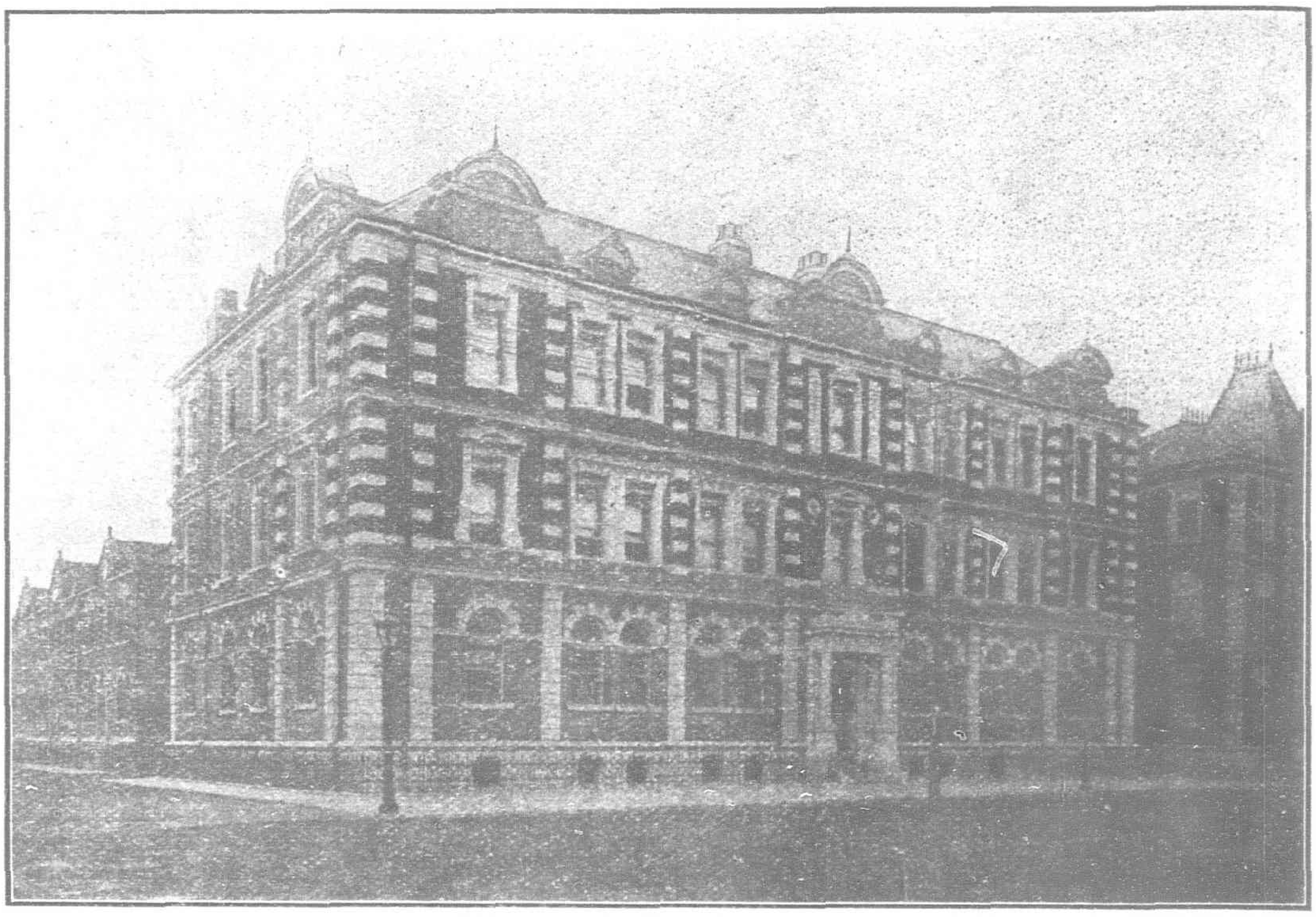


HEAD OFFICE OF THE FURUKAWA MINING CO., TOKYO

numbering over ten with a total superficial area of 26,000 acres. The total output in 1907 was Yen 6,600,000 for mineral products and Yen 1,998,000 for coal. The following table gives the latest amount of production for the different mines.

Ashio Mine	Copper.	12,000,000 lbs.
Innai Mine	Silver.	106,666 oz.
Ani Mine	Copper.	2,200,000 lbs.
Kusakura Mine	,,	510,000 ,,
Nagamatsu Mine	,,	460,099 ,,
Otori Mine	,,	220,000 ,,
Furokura Mine	,,	1,000,000 ,,
Midzusawa Mine	,,	450,000 ,,
Kune Mine	Mineral ore.	44,444 ,
Western Mining Department.		
Shiogami, Menoo	Coal.	380,000 tons.
Shinoyamada	Coal.	110,000 ,,

ASHIO COPPER MINES

(Annual production 7,000 tons of copper)

Location

The Ashio Copper Mines are in the town of Ashio in Tochigiken, about 18 miles from Nikkō.

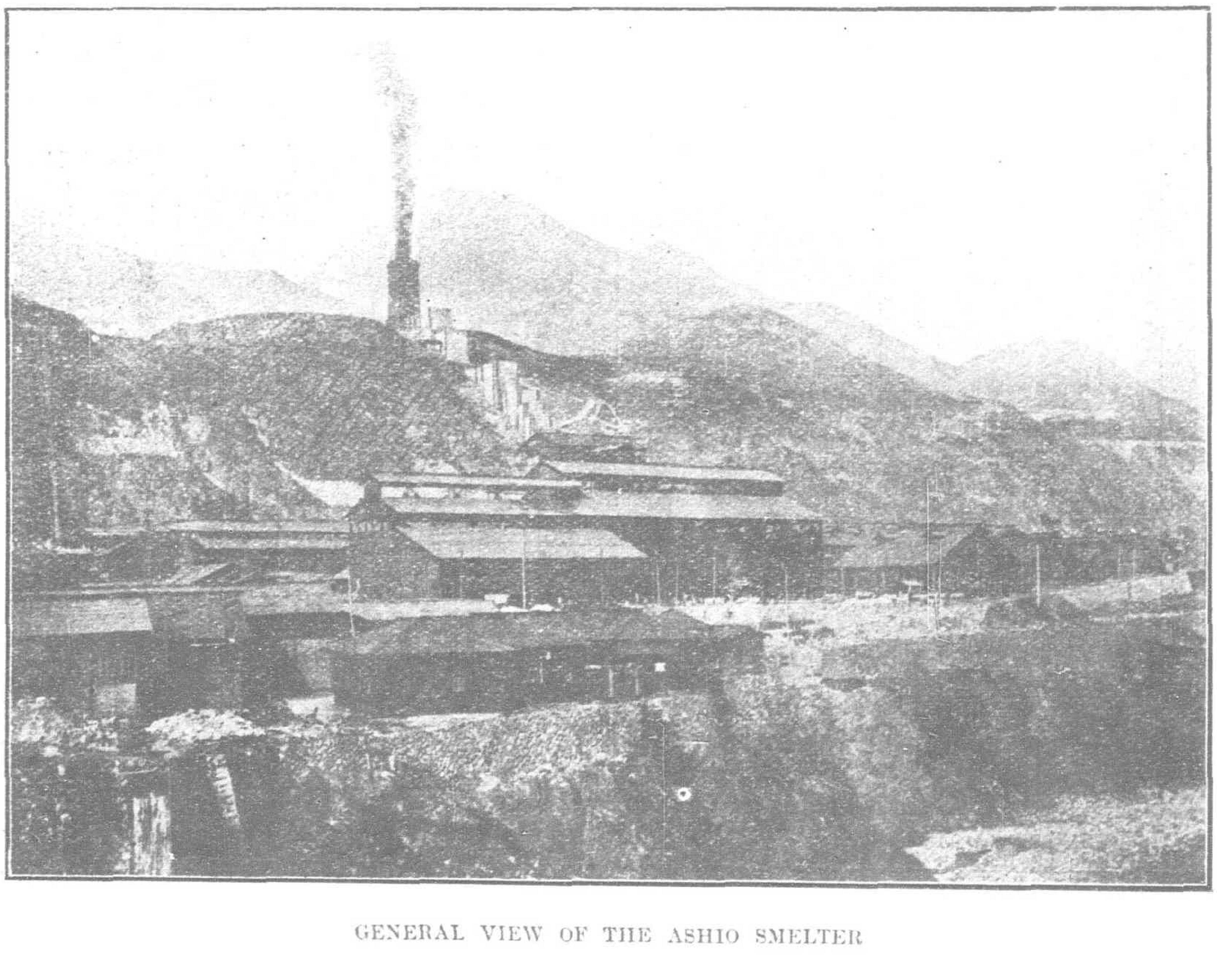
The area of the concession is 1,500 acres. The mines are divided into three, viz. Honzan, Kotaki, and Tsūdō, which are distant three miles from each other. Each has its own dressing plant, and the reduction works are at Honzan while the copper works are established in Nikkō.

History

The Ashio Copper Mines were discovered in 1609 and were a producer in 1611. Under the administration of our government, they were developed to reach a productive capacity of about 150 tons of copper yearly in the latter half or seventeenth century, but unfortunately in the nineteenth century it was decreased again. In 1871, they were transferred to private hands, and in 1877, the property at last came into the possession of the late Ichibei Furukawa, the father of the president, in such poor condition that the yield was only 52 tons of the copper a year.

By the vigorous efforts and careful administration of the late I. Furukawa and his successors, the mines were brought up to the present state—the largest copper mines in the Empire,—reaching an annual productive capacity of 7,000 tons.

In 1905, the Nikkō Copper Works were founded with the object of refining the bessemer copper from Ashio Copper Mines as well as the blister coppers from other mines of our company. In 1908, they absorbed the Honjō Copper Works of our company, and now manufacture electrolytic copper, bars, wire, etc.



GENERAL VIEW OF THE ASHIO SMELTER

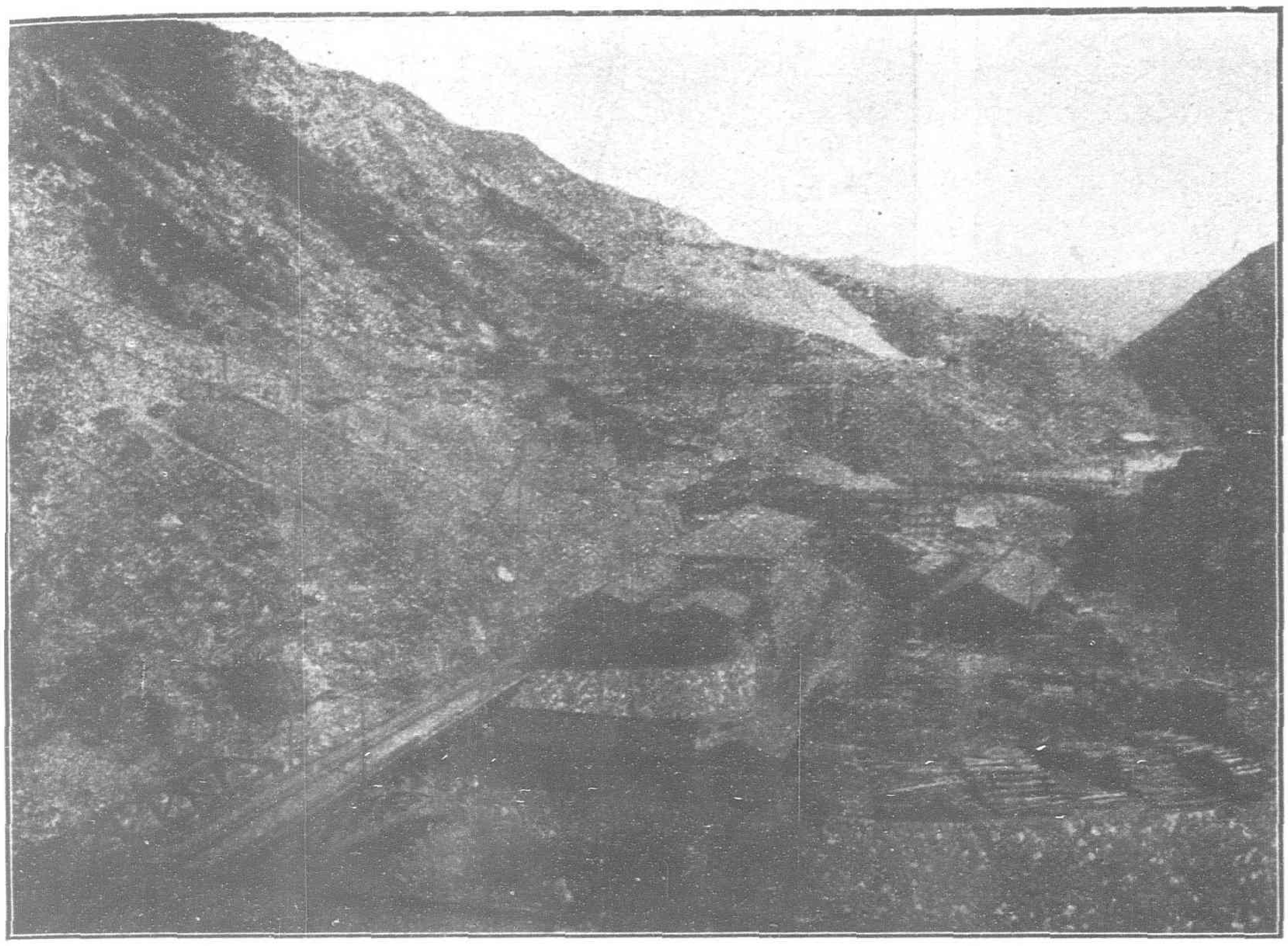
Geology and Ore Deposit

The district of Ashio consists of chiefly Paleozoics and liparite. The Paleozics are composed of slate, quartzite and limestone. The liparite is a volcanic neck erupted through the Paleozoics and is more than 2 miles in diameter.

The ore deposit of Ashio Mines is veins, most of which traverse the liparite, but the remainder run in the liparite as well as the Paleozoics, or in the Paleozoics only. The dip of the veins is mostly very steep, and the strike is classified into two, viz (I) N 50°-60° E and (II) N 80°-85° W. The veins on the first strike are called the sixty degree, or Yokomabu Series, and the others are the hundred degree or Shinsei Series.

The mines have more than 200 lodes, and among them 30 of the Yokomabu Series and 40 of the Shinsei Series are now being worked. The fissures of both series of veins are broken out simultaneously by the lateral pressure which folded the main mountain system of the north arc of Japan. They intersect with each other and form rhombic nets of veins. The lodes are generally 1-16 ft. thick and 400-6,000 ft. long.

The chief constituents of the veins are chalcopyrite and pyrite ; and quartz as a vein stuff. Besides, zincblende, arsenopyrite, galena, and pyrrhotite frequently occur. Bornite, chalcosite, cuprite, malachite, pisanite, sometimes azurite and native copper are all found in the oxidized zone. Besides quartz as a vein stuff, there are found calcite,



GENERAL VIEW OF KOTAKI, ASHIO COPPER MINES

and sometimes gypsum, which is the secondary mineral. Very rarely fluorite, crystallized vivianite, ludlamite, wolframite, and apatite are found.

Yokomabu is the champion lode, 6,000 ft. long, and the next is Kōsei, having 3,000 ft. in strike. The veins of Jimbō, Yasubeihi, and Deai are more than 2,000 ft. long. The Kōsei-machi, and Tengu, supposedly the same vein, have a total length is 4,500 ft. Eisei and Shinsei are more than 2,000 ft. long.

Mining

Main Levels and Shafts. The three mines of Honzan, Kotaki, and Tsūdō communicate with each other by levels and shafts, of which a few principal ones will be briefly described in the following lines:

Honzan Mine.

Ariki level:—The adit is situated at the north-eastern foot of Bizendate Peak. The level is driven mainly along the strike of Yokomabu-vein, and is 10 ft. high, 10 ft. wide and about 7,000 ft. long. It is the most important level for transportation and drainage in Honzan Mine.

Honkuchi level:—The level is older than Ariki, and is 300 ft. above Ariki level, being numbered to be the fourth level from the latter. It is also driven along the strike of Yokomabu vein, and is 7 ft. high, 8 ft, wide, and 6,000 ft. long. In the upper part of this level, there are more than 10 levels and many working places can be seen.

Honkuchi shaft:—The shaft (6 ft. × 9 ft.) is situated about 2,600 ft. from the mouth of the Honkuchi level, and reaches Ariki level.

1st and 2nd Yokomabu shafts:—1st Yokomabu shaft (6 ft. × 11 ft.) and 2nd Yokomabu shaft (6 ft. × 18 ft.) are situated on Yokomabu vein at a distance of 4,600 ft. and 2.500 ft. respectively from Ariki adit, whence at a depth of 457 ft. and 410 ft. they reach Tsūdō level. A winding apparatus is fitted up in each shaft. There are 7 levels and many working places which are now being operated prosperously.

3rd. Yokomabu shaft:—The shaft (5 ft. × 12 ft.) is 1,900 ft. from 1st Yokomabu shaft and passes through Tsūdō level at 466 ft. below Ariki level, and moreover further sinking is going on. Winding apparatus is provided in this shaft mouth for the working below Tsūdō level.

Kotaki Mine

Kotaki level:—The adit is situated at the south western foot of Bizendate Peak, and 45 ft. below the Ariki adit. It is driven chiefly along the strikes of Kōsei, and Tengu vein, and connected with Ariki level. It is the lowest and also the most important for transportation and drainage in Kotaki Mine. Both Kotaki and Ariki levels are used as a trunk line for the underground communication between Honzan and Kotaki Mines. There are 12 levels above this level and 6 levels below within the reach Tsūdō level.

Kotaki shaft:—The shaft (6 ft. × 14 ft.) is situated near Kōsei vein and at a distance of 2,100 ft. from Kotaki adit, and it reaches Tsūdō level at a depth of 405 ft.

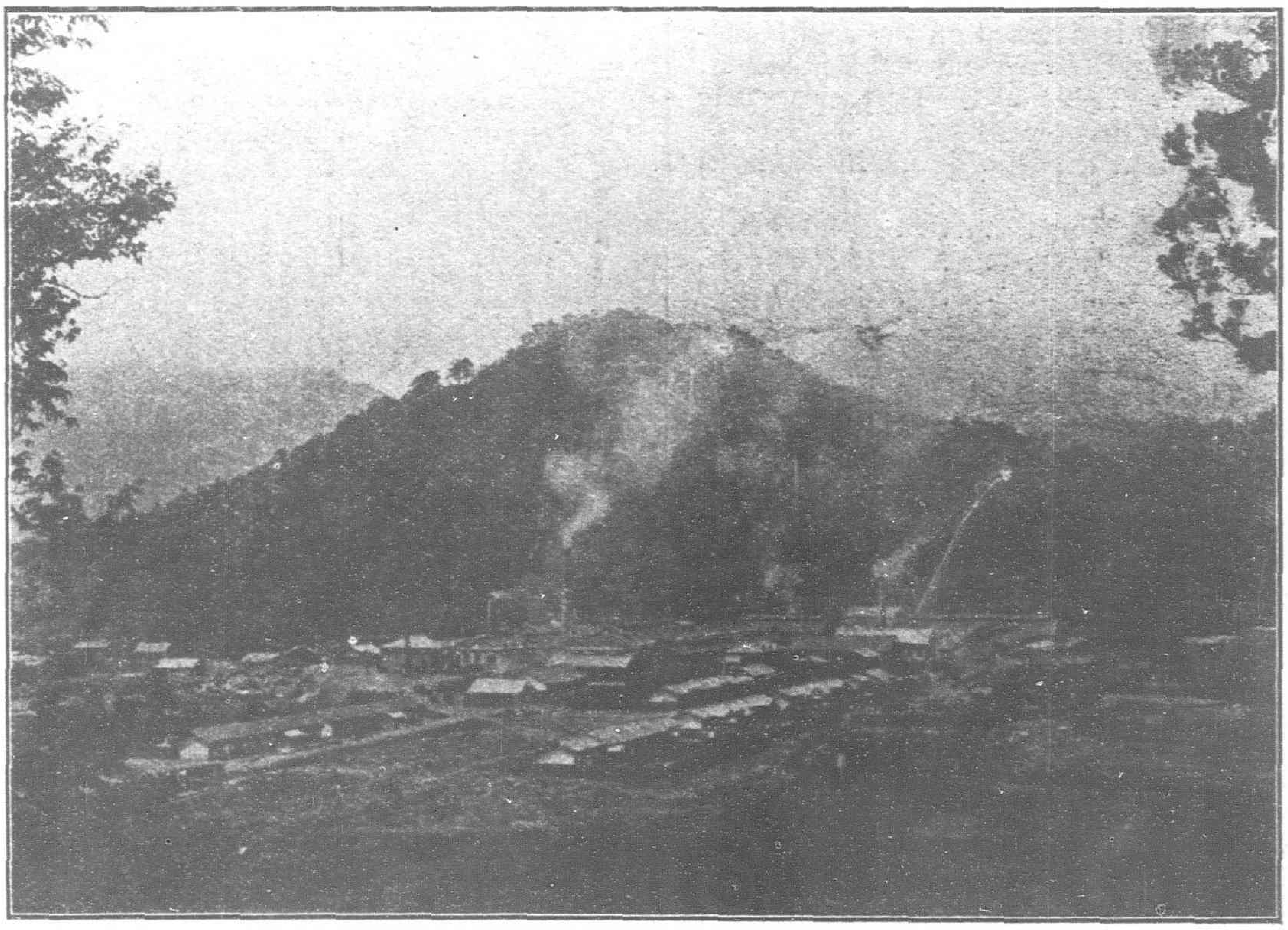
Tsudo Mine

Tsūdō main adit:—The adit is located on the bank of the River Watarase, and is 475 ft. lower than Ariki level. The driving of the level began in 1885 and the level reached Yokomabu vein in 1895, after having proceeded on about 10,000 ft. toward north. More than fifty veins were cut during the driving and most of them are working prosperously now.

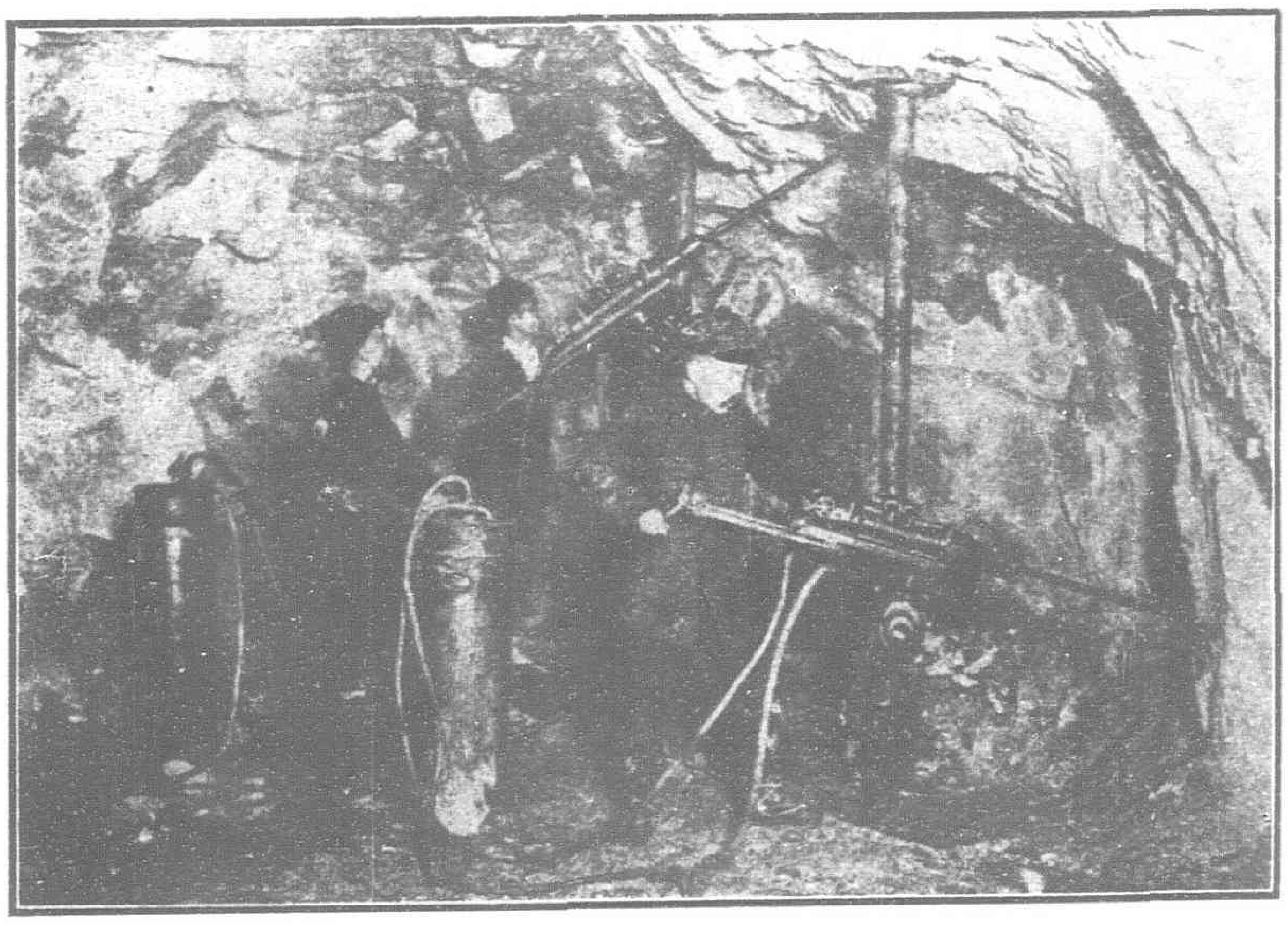
It is the main drainage and transportation level at present, being 11 ft. high and 13 ft. wide.

Honban level:—At a height of 620 ft. from Tsūdō adit, we can find this Honban level. There are 7 levels below it, and 2 levels above it.

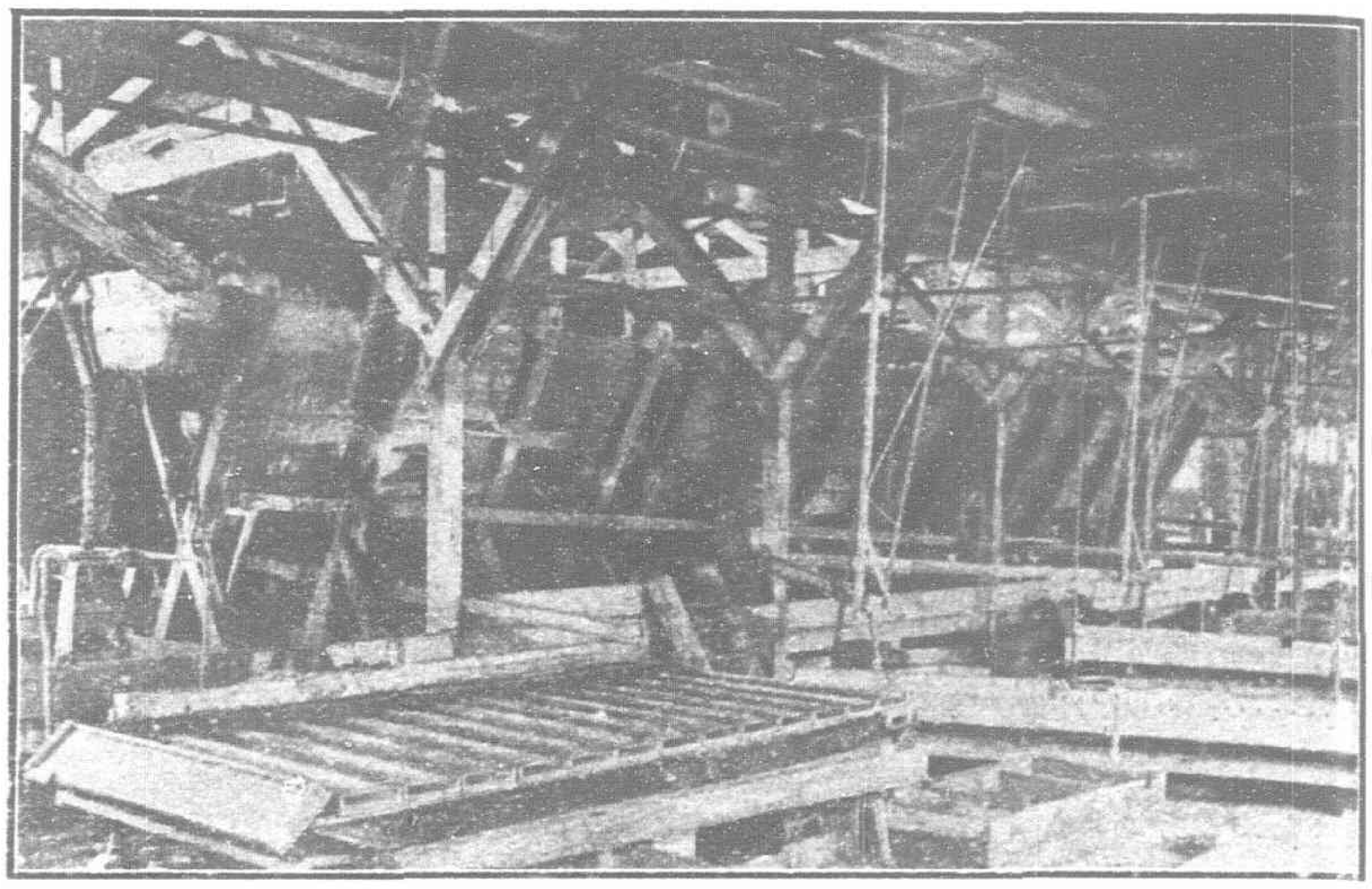
Shinnashi shaft:—The shaft (9 ft. × 12 ft.) opens near Tsūdō dressing plant,



GENERAL VIEW OF NIKKO COPPER WORKS



"LEYNER" ROCK DRILLS, ASHIO COPPER MINES



OVERSTROME CONCENTRATORS AND WILFLEY SLIME TABLES, TSUDO, ASHIO

being 107 ft. deep, and communicates with Tsūdō adit at a distance about 800 ft. from this adit mouth. The shaft is used for winding crude ores and rubbish.

1st. Kōsei shaft:—The shaft (6 ft. × 18 ft.) is very near Kōsei vein, and is situated at a distance of 2,600 ft. along the No. 23 vein westward from the Tsūdō adit. The depth of this shaft is 843 ft. at present and further sinking is now in progress. There are 7 levels connecting with this shaft for the working of the veins Kōsei, Kōseimaehi, Tengu, Rensei, etc.

2nd. Kōsei shaft:—The shaft (6 ft. × 18 ft.) is located at a distance of 2,000 ft. westward from 1st Kōsei shaft along the vein Kōsei. It is 420 ft. deep. There are 4 levels connecting with the shaft for the working of eastern part of the vein.

Kōsei-maehi shaft:—The shaft (6 ft. × 23 ft.) is situated on the vein Kōsei-maehi; and the present depth is 352 ft. below the Tsūdō adit. Further sinking is now in progress.

The total length of levels in use is as follows:

Honzan Mine	270,000 ft.
Kotaki Mine	160,000 ft.
Tsūdō Mine	130,000 ft.
Total	560,000 ft.

The vertical extent of the veins—from the highest outcrop to the lowest level—being now excavated is as follows:

Outcrop on Bizendate Peak to Tsūdō adit	2,200 ft.
Below Tsūdō adit . . .	800 ft.
Total	3,000 ft.

Prospecting and Working methods. The prospecting is chiefly done by level driving with a size of 4 ft. × 7 ft. either along the vein, or crosscutting with an interval of 60 ft. in height. As to the lower part of the Tsūdō adit, the level driving is commenced in the same way from the shaft at a rate of 110 ft.

Overhand stoping is generally adopted here, and sometimes underhand stoping and *Nukibori* (special working for the richer part of vein) are used. Each stope is 6 ft. high and more than 2½ ft. wide varying according to the thickness of the vein being worked.

The excavation is chiefly done by hand, but the rockdrill is used to some extent in driving, sinking, etc. There are several kinds of rockdrills in use, for instance, Water Leyner, Little Wonder and others.

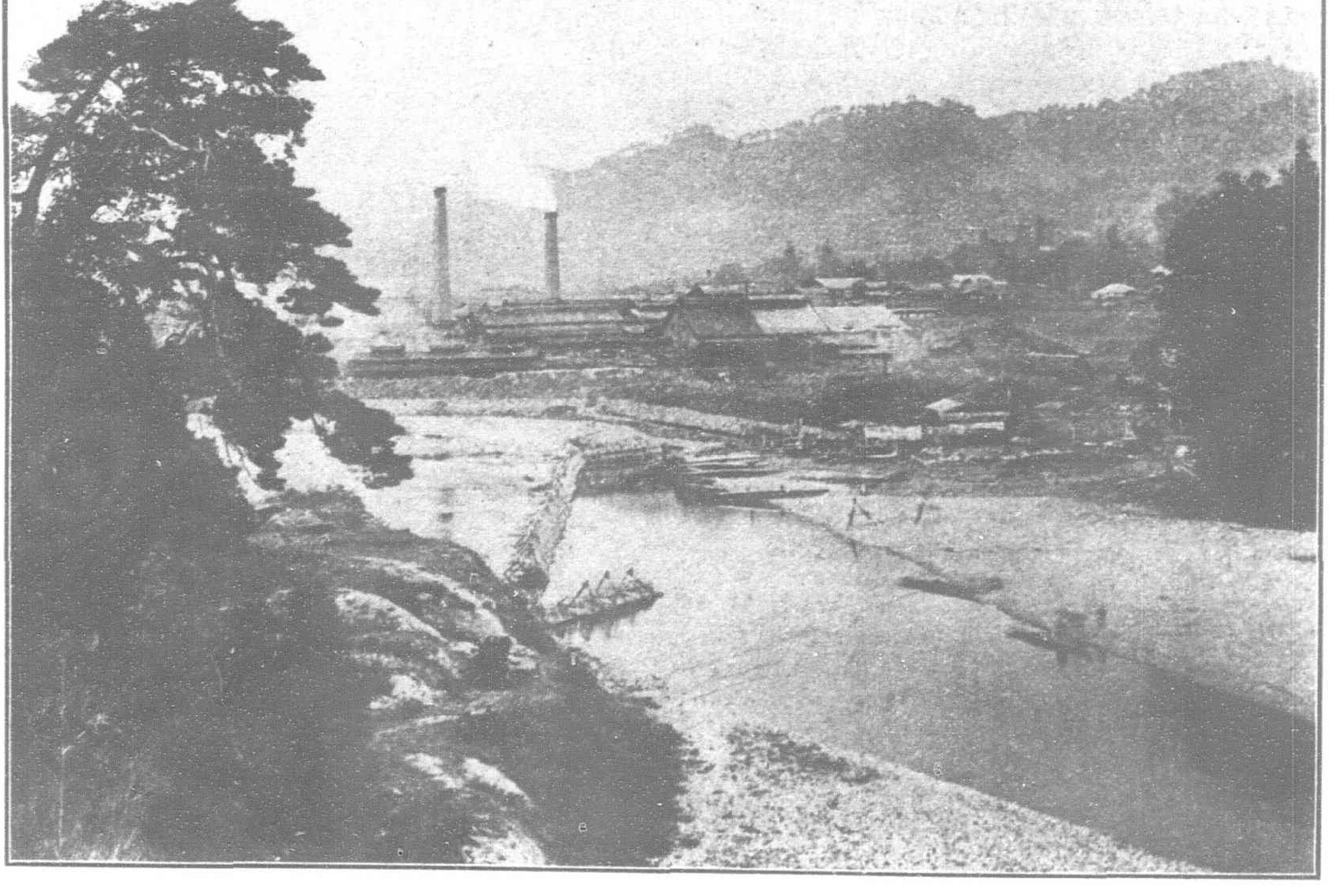
The present numbers of workings and miners are as follows:

Prospecting .	450 places,	1,000 men.
Stoping . . .	1,000 ,,	1,600 ,,
Nukibori. . .	40 ,,	150 ,,
Total . . .	1,490 ,,	2,750 ,,

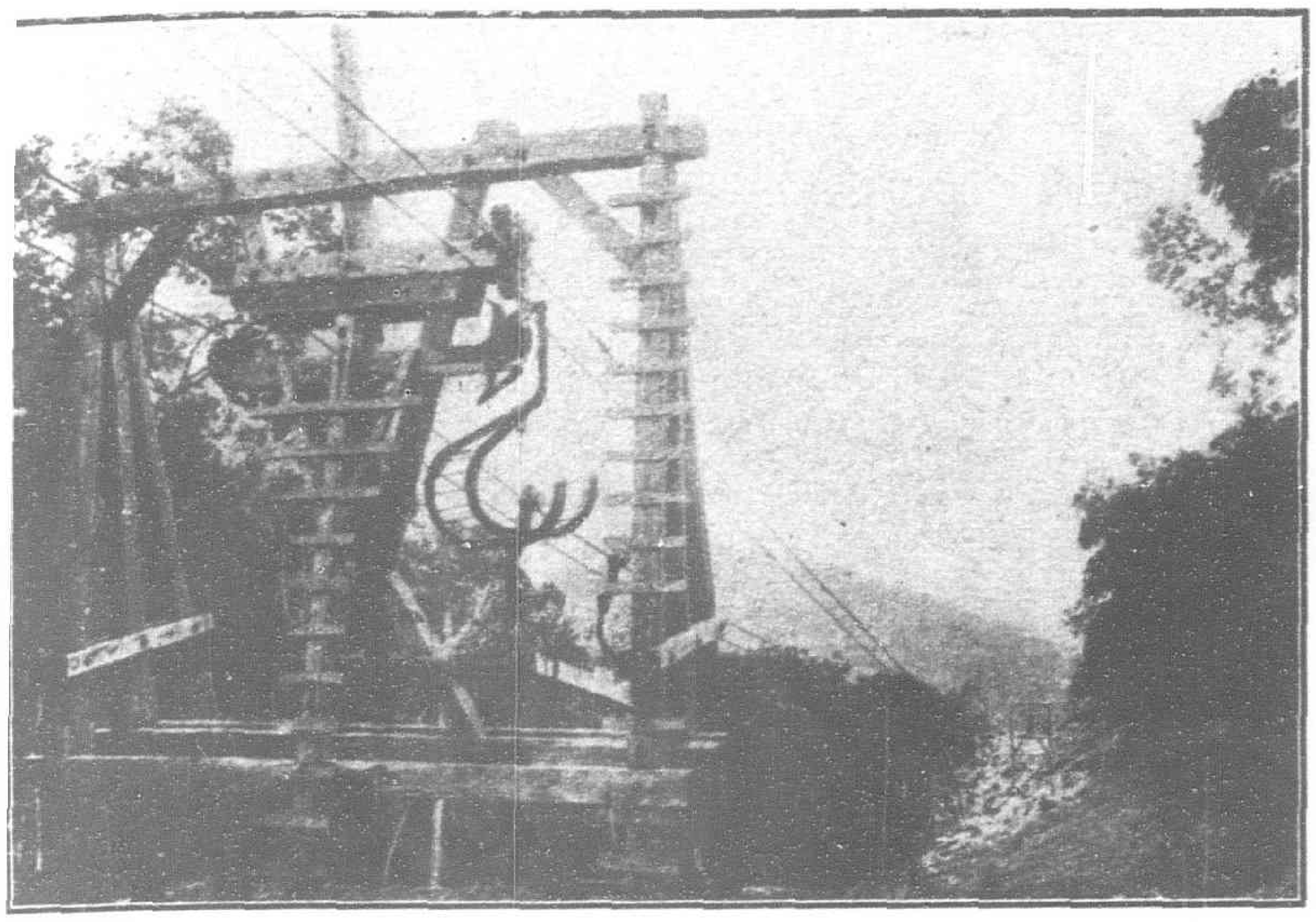
Timbering. As the materials of timbering, only rough round logs are used in the mines. There are several forms of timberings such as simple legs and cap, saddle back, and polygonal shape, each being used according to circumstances. It is quite interesting to write that large excavated spaces such as the winding and pumping rooms, about 40 ft. wide, about 25 ft. high, are well timbered with big logs.

Transportation underground. The ores, rubbish, and various supplies are transported by electric locomotives, electric windings, and other means according to circumstances.

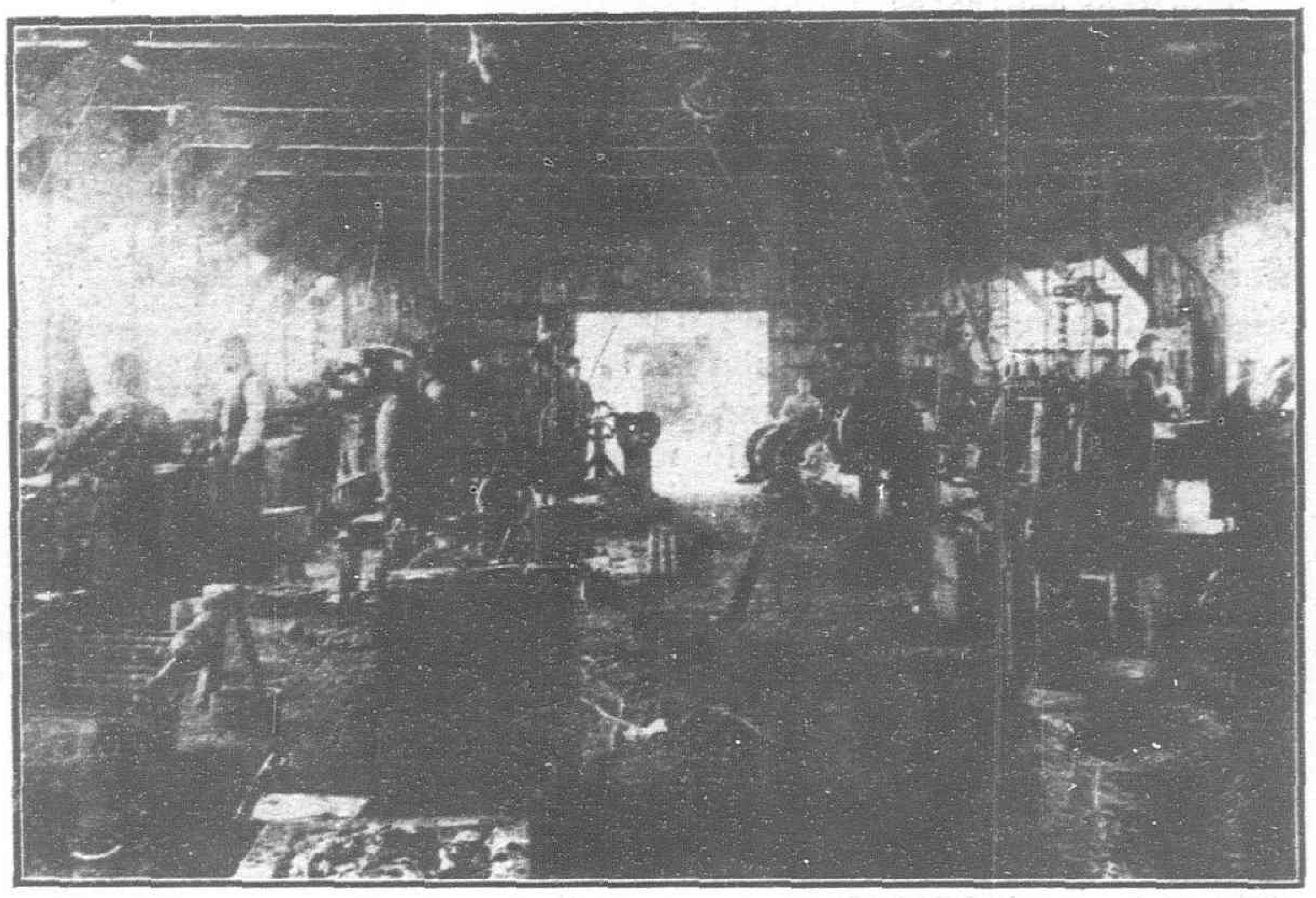
The electric locomotives are widely adopted in the three main levels of Ariki, Kotaki, and Tsūdō. The ores of the mines Kotaki and Honzan, directly, and those of Tsūdō after being wound up through Shinnashi shaft, are transported to their own dressing plants. The rubbish of Honzan and Tsūdō is transported directly to the dump, while that of Kotaki is brought to the rope-way terminal, whence it is sent to the dump.



GENERAL VIEW OF ANI COPPER MINES



DOUBLE ROPE TRAMWAY AT NERI, ASHIO



ELECTRICAL REPAIR SHOP, ASHIO

Winding machines are equipped in all the shafts in the mines, and the following is a brief description of them.

Name.		depth.	type.	H.P.
1st. Yokomabu shaft.		495 ft.	Electric double drum	40.
2nd. Yokomabu	..	637 ft.	..	50.
3rd. Yokomabu	..	933 ft	..	50.
Honkuchi	..	295 ft.	Self acting drum	
Kotaki	..	588 ft.	Electric double drum	50.
1st. Kōsei	..	843 ft.	..	100.
2nd. Kōsei	..	420 ft.	..	75.
Kosei-machi	..	352 ft.	.. (temporary.)	25.
Sunokobashi	,,	337 ft.	,	35.
Shinnashi	..	107 ft.	..	80.

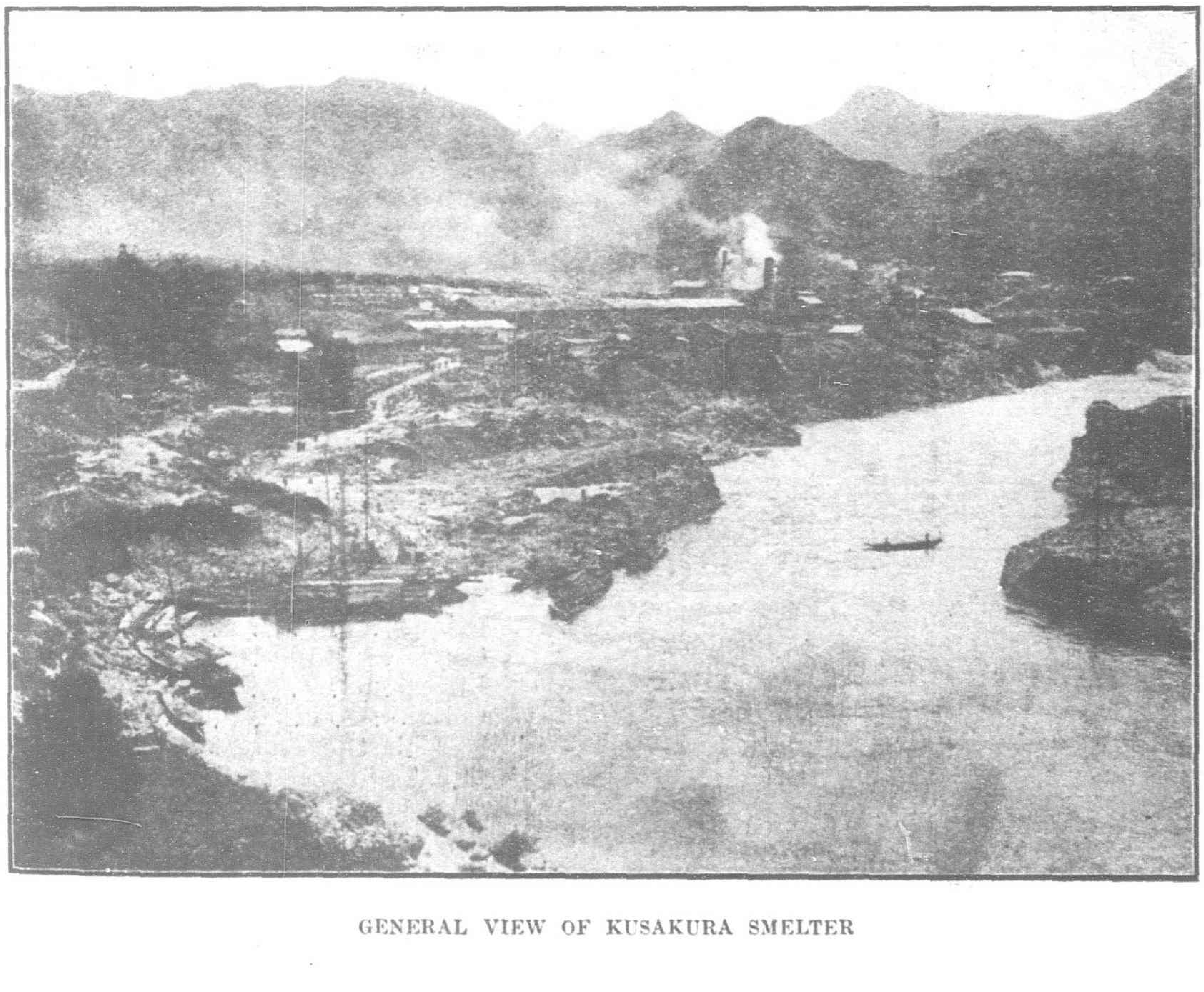
Pumping and Drainage. The Ariki and the Kotaki levels are used to drain out the mine water coming from the above but the rest of the water is drained out from the Tsūdō adit.

There are a great number of pumps of which the principal are as follows:

Site.	type.	No.	H.P.
1st. Kōsei shaft.	Sulzer two stage turbine pump.	3	50.
..	Riedler single differential pump.	3	100.
..	.. .. ..	1	75.
..	Escher-Wyss turbine pump.	1	75.
..	Knowles vertical pump.	2	25.
..	Special rod pump.	2	30.
2nd. Kōsei shaft.	Blake pump.	1	50.
..	Knowles pump,	2	15.
3rd. Yokomabu shaft.	Escher-wyss turbine pump.	3	75.
..	Knowles vertical pump.	2	15.
2nd. Yokomabu shaft.	Tanaka's vertical pump.	2	15.
..	Knowles vertical pump.	1	25.
..	Knowles sinking pump.	1	5.
..	Blake rod sinking pump.	2	50.

Ventilation. The ventilation is secured by the natural draught but sometimes the circulation is helped by the means of regulating doors, wind boxes, etc. The wider the extension below the Tsūdō adit become, the more the difficulties of the ventilation increase, and centrifugal fans are used for blowing in the fresh air.

Lighting. The main levels, the pumping and winding stations and the watch houses are illuminated by electric light. Each miner carries a small seed-oil lamp with a naked light.



GENERAL VIEW OF KUSAKURA SMELTER

Transmission of Electricity in the mine. All the machinery in the mines is driven by electricity. 11,000 volt alternating current from Hosoo hydro-electric power plant is transmitted into three substations—Matō, Kotaki and Sunokobashi—where it is transformed down to 2,200 volts. In the Matō the 2,200 volt alternating current is partly converted to direct current of 450 volts, which is used for the driving of tramway locomotives and the winding machines in Honzan Mine. The 2,200 volt alternating current from Sunokobashi substation is transformed down again to 500 volts near the 2nd Kōsei shaft, whence it is transmitted to several machines thereabouts. The alternating current from Kotaki substation is also stepped down to 500 volt near 1st: Kōsei shaft for the driving of several machines in Tsūdō Mine. The power for Kotaki Mine is supplied from Kotaki substation. The mine locomotives in Tsūdō Mine are driven by direct current of 450 volts from the Tsūdō power plant.

For the transmission of 500 and 2,200 volt alternating current, steel armoured paper cables and lead covered paper cables are used. The length of the cables for 2,200 volt alternating current is 32,000 ft., and that for 500 volt is 11,000 ft.

Dressing

Crude ores here in the mines are classified into two kinds; 1st grade and 2nd grade. The former is rich ore sorted underground and carries 12% copper on the average. The latter averages 1% copper more or less.

The daily output of crude ores from the three mines is as follows:

	quantity	percent of copper	copper content
1st. grade.	145 tons.	12.4	17.4 tons.
2nd ..	610 ..	1.0	6.1 ,,

Three mines have their own dressing plants, and the dry and wet processes are adopted in these plants. The operatian is described in the accompanying schemes.

The driving of the machinery of the dressing plants is chiefly done by electricity.

The concentrates from these plants are 170 tons daily on 12% copper.

Cement Copper

There are two sources for the winning of cement copper. (1) old workings, abandoned levels, and gob or stope fillings having been exposed for a long time to the oxidizing influence, are the producers of the high grade cupriferous water. (2) the other is the weathered rubbish which has been neglected for years in the dumps. From the waters which reached through them, the copper is precipitated by means of scap iron.

The production is 1.2 ton of 58% copper a day, which is sent directly to the reduction works.

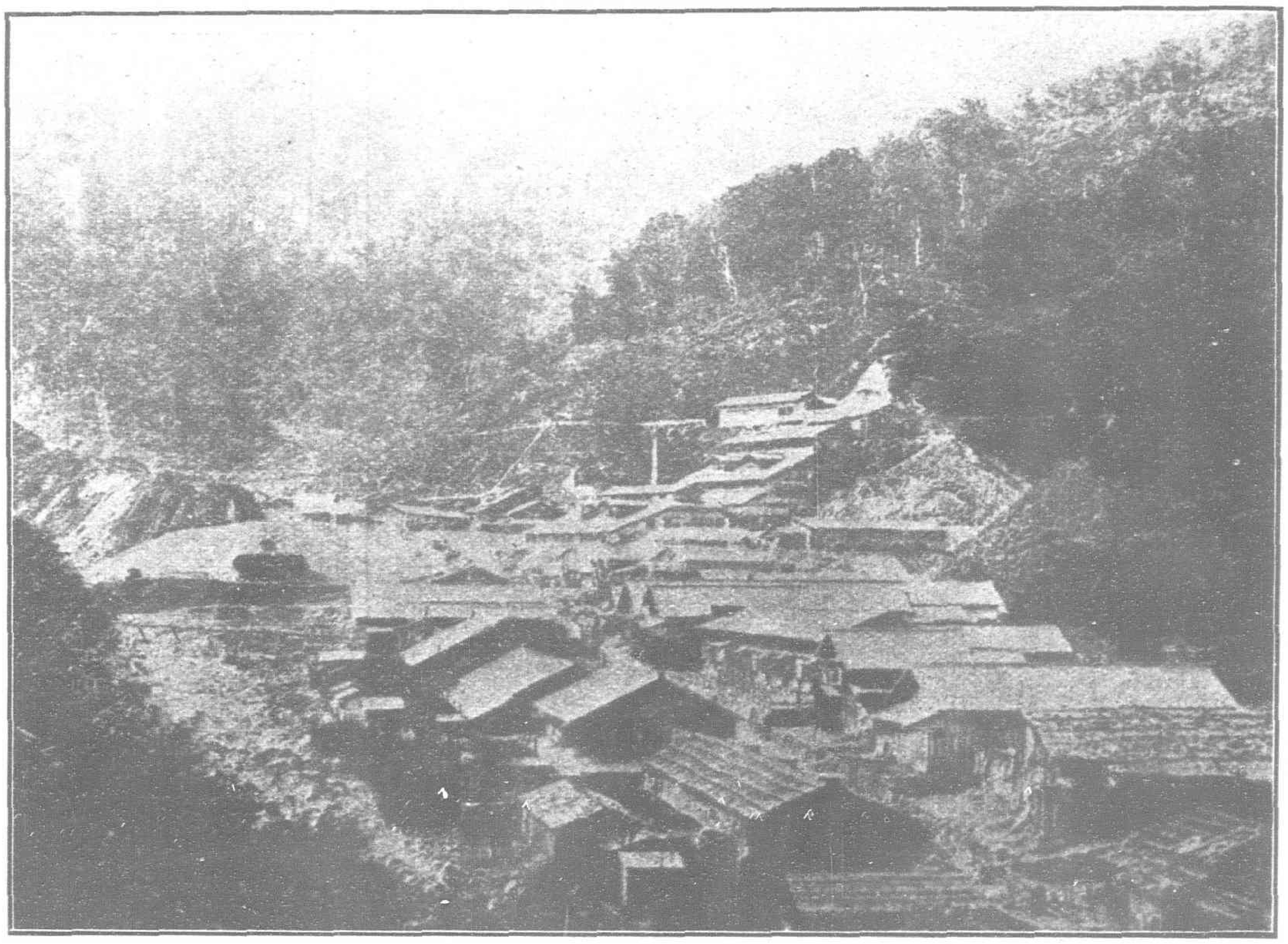
Reduction

Ores: The ores consist chiefly of chalcopyrite, pyrite, quartz and a little zincblende and galena. The receiving ores are classified into five: viz. lumps, grains, sands, slimes and cement copper. 60,000 tons of ores on 12% copper are being treated annually, which indicates the production of about 7,000 tons of copper.

Smelting process: The lumps are charged to the blast furnace in a raw state, and the fines in a sintered or a bricked state. The matte thus obtained is subjected to the Bessemer process.

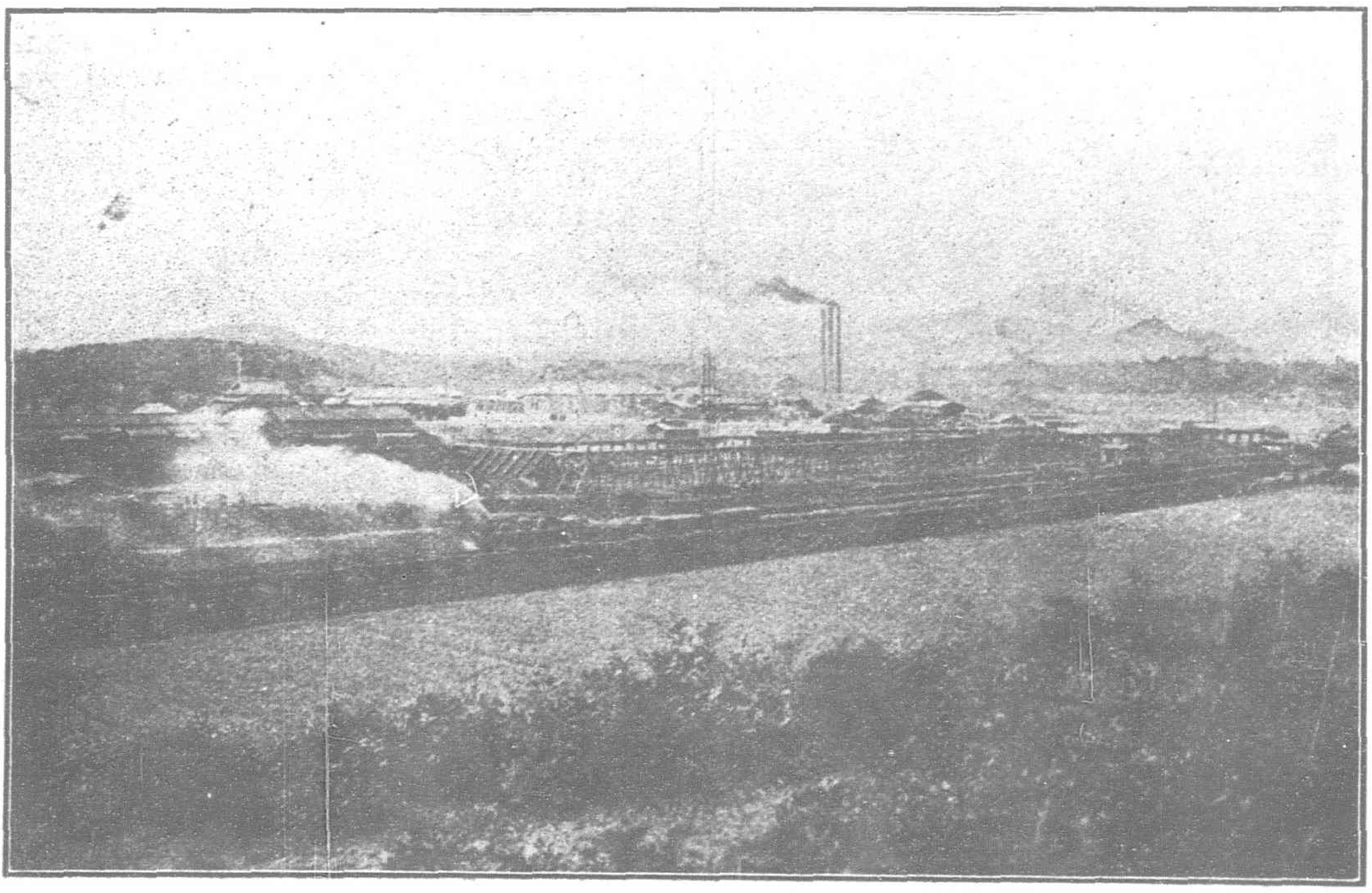
Pot-roasting. Most fines are roasted in pots until they become spongy. The pot used here—of a conical shape—is made of iron plate and has a false bottom which is worth notice, from which the blast is forced in. One charge is about 7 tons of ore. After the sintered mass is cooled thoroughly, it is crushed into suitable size for charging to the blast furnaces. There are twelve pots in two rows, which are used alternately.

Briquetting (patent processes.) There are two processes of briquetting of fine ore for which we hold the patents in America and Japan.



GENERAL VIEW OF FUROKURA COPPER MINES

The first:—The ore is first moistened with water and then compressed into a ball of the desired size by machinery. Such a ball is placed within the metal mold and the molten matte is then permitted to fill the space within the mold around the ball, and allowed to congeal. A series of the molds are mounted upon an endless carrier which is driven by an electric motor. It is quite interesting to charge the briquets into the blast furnace without the necessity of drying and without the danger of breaking.



SHIOGASHIRA COLLIERIES

The second:—The dried fines and molten matte are allowed to run into the pot, stirring them so that they may be thoroughly mixed together therein. When the mixed mass is chilled sufficiently, it is dumped out of the pot and crushed into suitable size for charging the furnace.

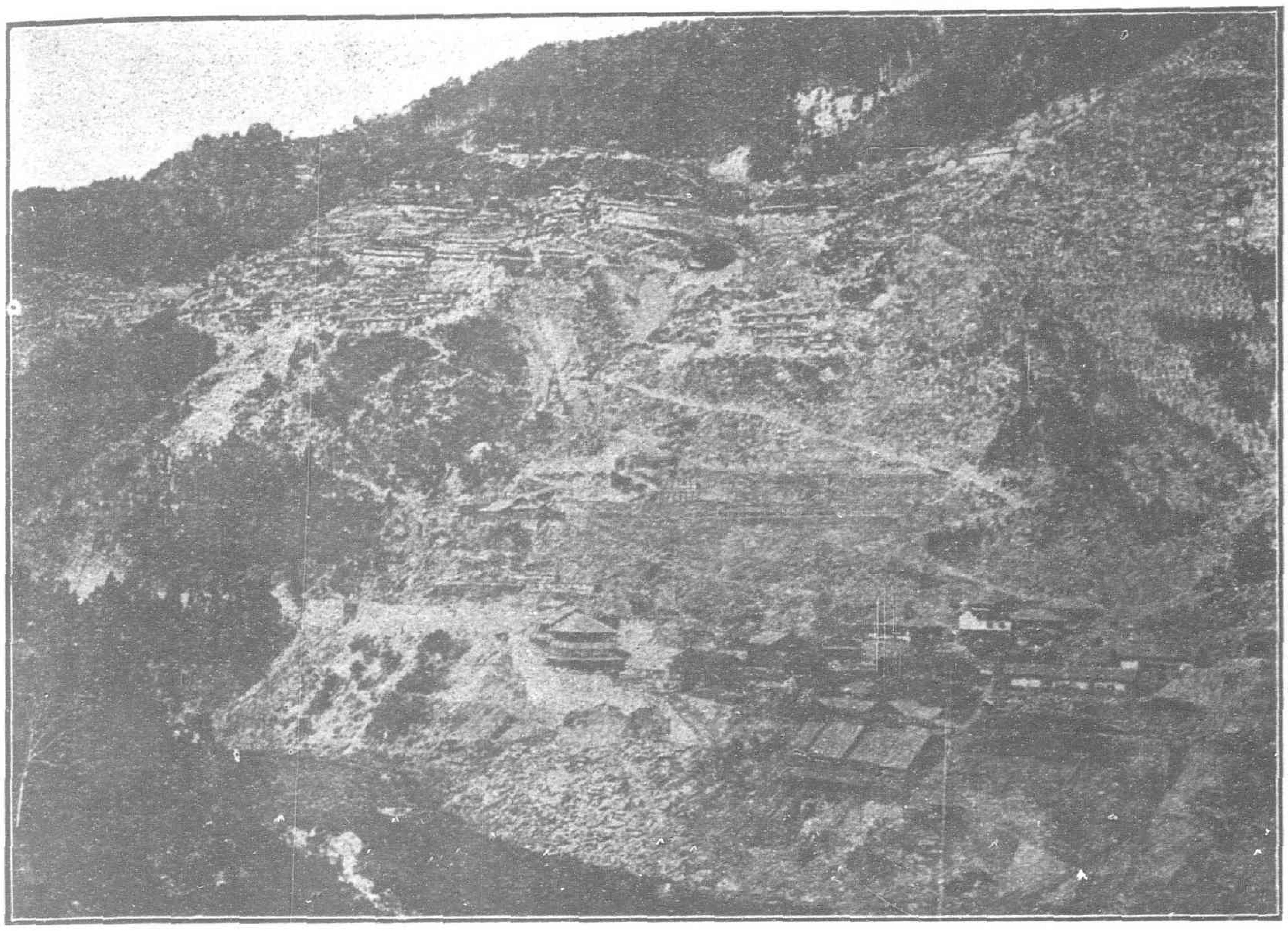
Briquetting (common process). The fines are mixed with slime water, and filled up into the mold, and then stamped into briquets. When they are sufficiently dried up in the drying furnace, they are charged into the blast furnace.

Smelting. The smelting is done by rectangular water jacket blast furnaces. There are three furnaces of the same size. The dimensions of the furnace are 160 inches × 42 inches at the tuyere; the height from the center of the tuyeres to feed floor, 8 ft. 6 inches; each furnace has 24 tuyeres whose diameter is $4\frac{1}{2}$ inches, and has one forehearth, 12 ft. in inner diameter, 4 ft. in height. The forehearth is lined with magnesite bricks. For each blast furnace, a Roots blower No. 8 is equipped.

The normal charge composition is as follows:

Lump ore	3,600 lbs.
Sintered ore	3,500 ,,
Briquet	1,100 ,,
Converter slag . . .	1,600 ,,
Limestone	2,200 ,,
Coke.	650 ,,

The blast pressure is $1\frac{3}{8}$ lbs. per sq. inch. The capacity of each furnace is 90 tons for 24 hours. The grade of the matte averages 40% copper; and the composition of the slag is sillica 40%, ferrous oxide 30%, lime 20%, alumina 9% and copper 0.2%.



GENERAL VIEW OF KUNE COPPER MINES

Converting. Keeping the matte out of the furnace in the forehearth, it is tapped out into a ladle in case of necessity and charge into converter by means of an electric travelling crane, and then the blast is started on. There are six converters, and two stands with hydraulic tilting gears, actuated by a high pressure, self-regulating pump, an accumulator, etc. The converter is of the barrel type, 72 inches in diameter, 100 inches in length, with 11 tuyeres, whose diameter is 1¼ inches. The tuyeres have Dyblie ball valves.

The blast is delivered by two horizantal blowing engines driven by electricity, capable of supplying 4,200 cub. ft. and 3,000 cub. ft. of free air per minute, and also a vertical one driven by water power, capacity 3,000 cub. ft. per minute. The pressure at the converters is 10 lbs. per sq. inch.

For the purpose of lining, a decomposed liparite is used.

The converters produce 45.000 lbs. of blister copper a day. The blister copper is poured out into molds by casting machines. Each ingot weighes 70 lbs.

Analysis of the blister copper.

Cu	99.125
Au	0.00016
Ag	0.10662
As.	0.029
Bi.	0.006
Fe.	0.052
S	0.028
Se & Te	0.038

Waste Water and Smoke Problem.

The smoke from all the furnaces is forced in to the special dust chamber for condensation. Having precipitated nearly all of the suspended dust in the chamber, the fumes enter the common flue and again proceed to the bottom of the desulphurizing tower, wherein the sulphurous acid gas is absorbed by a shower of lime water, and the purified gas escapes through the chimney. The waste water is sent to the precipitating and filtering ponds.

The tail water from the precipitation of cement copper, the slimy water from the dressing plant and the waste water from desulphurizing tower are agitated after being with milk of lime, and are sent to the precipitating and filtering ponds. They are then discharged into the river in the clean and non-acid states.

Power.

The power is chiefly supplied from the Hosoo hyro-electric power plant laid down in 1905, (12 miles from Ashio) developing 2,500 H.P. The power plant is being extended to 7,500 H.P. Besides, we have other small power plants.

The plants are as follows :

Site.	H.P. of Water Wheel.	Generator.	Kw.
Hosoo.	2,500	11,000 volt three phase alternating current.	2,000
,,	125	Direct current.	80
Betsukura.	900	11,000 volt three phase alternating current.	700
Watarase,	250	2,000 volt three phase alternating current.	220
Tsūdō.	400	2,000 volt three phase alternating current.	270
Kotaki	300	450 volt direct current.	120
,,	100	450 volt direct current.	50

Also there are seven small water power plants which total 500 H.P.

Transportation.

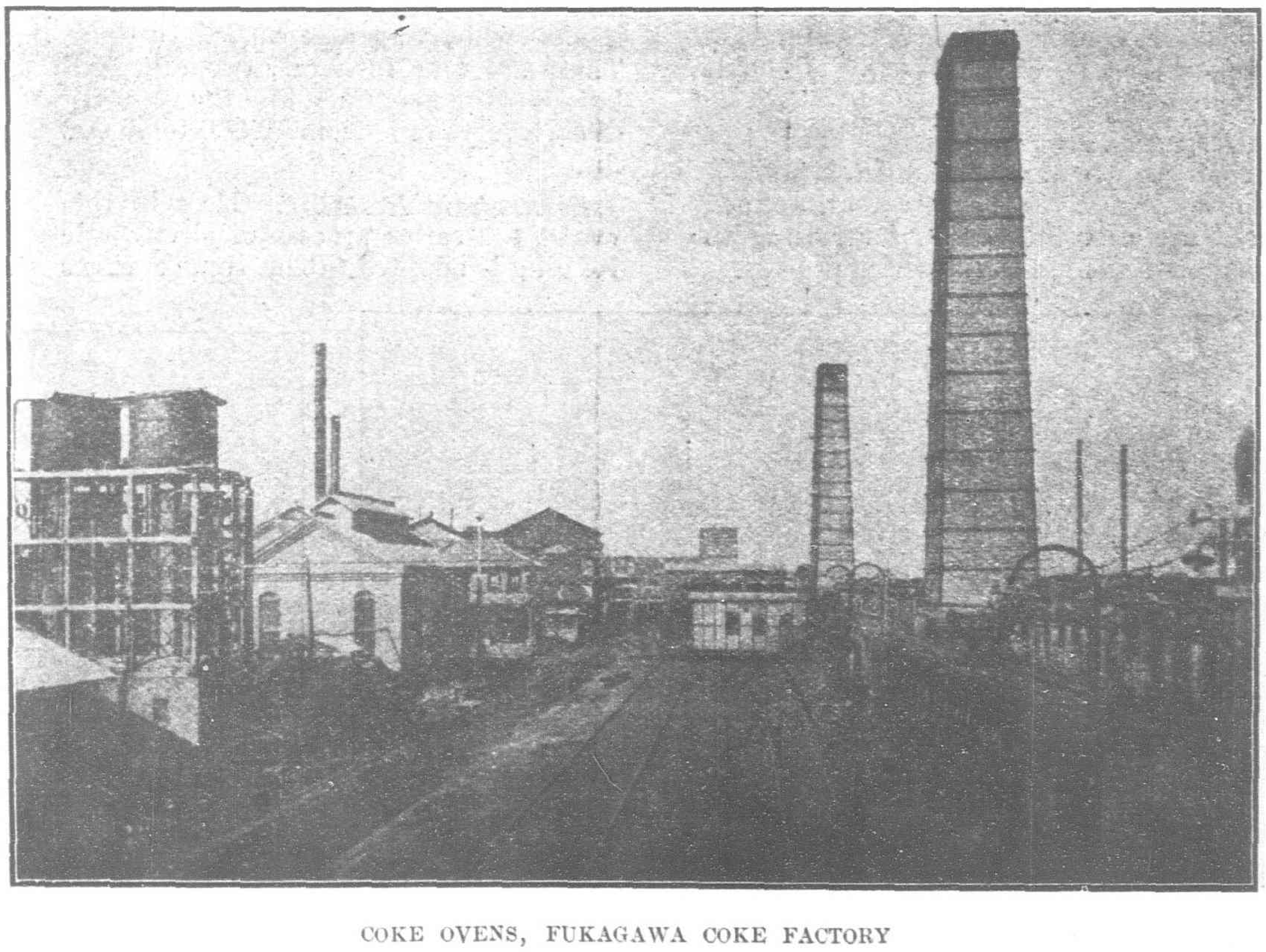
There are two principal transportation lines leading to the mines, viz. the Nikkō line and Ōmama line.

For the Nikkō line, tramways and aerial ropeways are provided now, and the capacity is about 1,300,000 ton-miles a year, this line being mainly used at present. For the principal part of the line, an electric railway has been just completed.

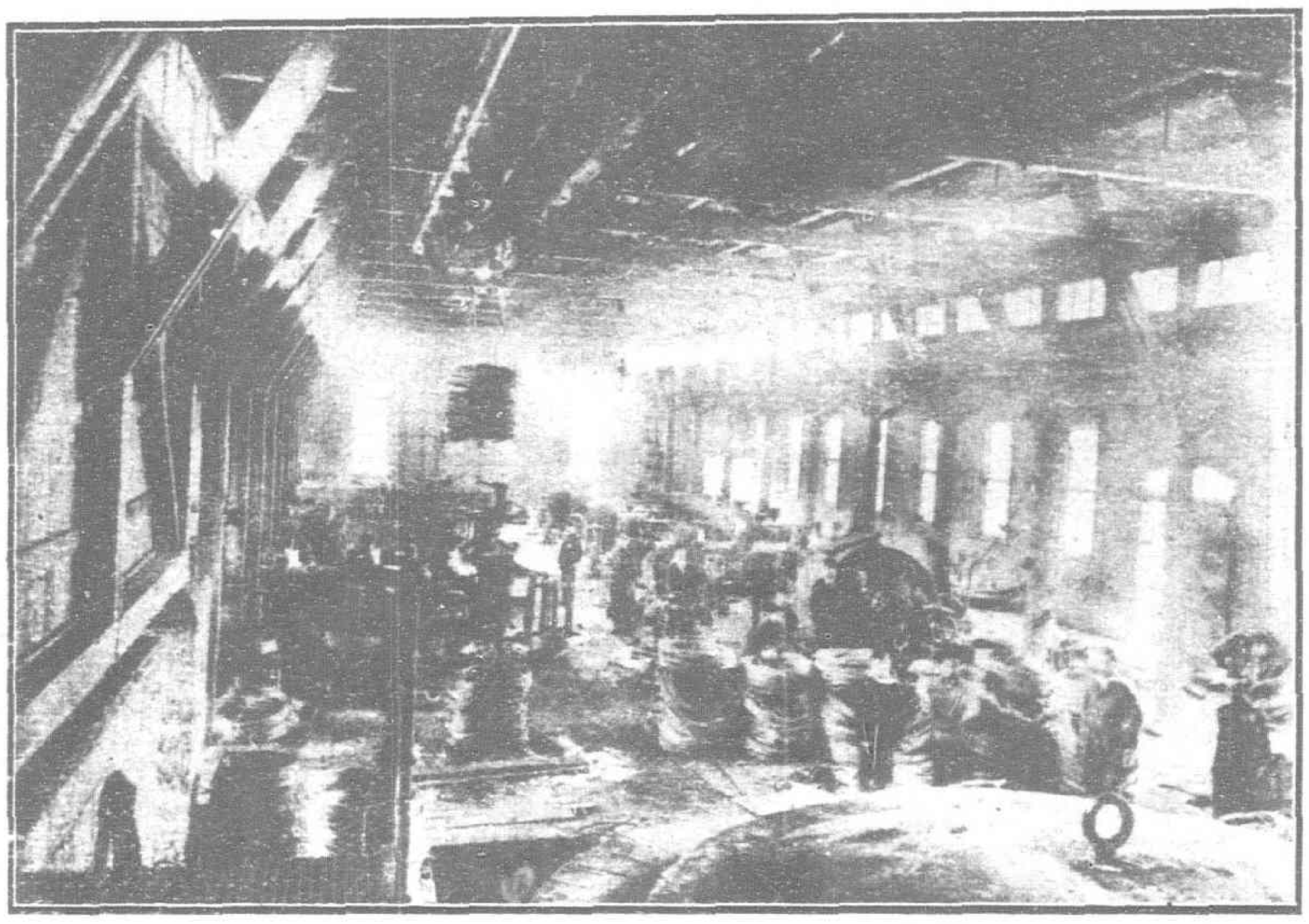
For the Omama line, wagons and tramways are used, but they are about to be superseded totally by a railway which is to be built by the Ashio Railway Co. connecting the mines and Kiryu station of the Imperial Government Railway. After the completion, this railway will be the main line of transportation.

Between each mine and reduction works, tramways are used.

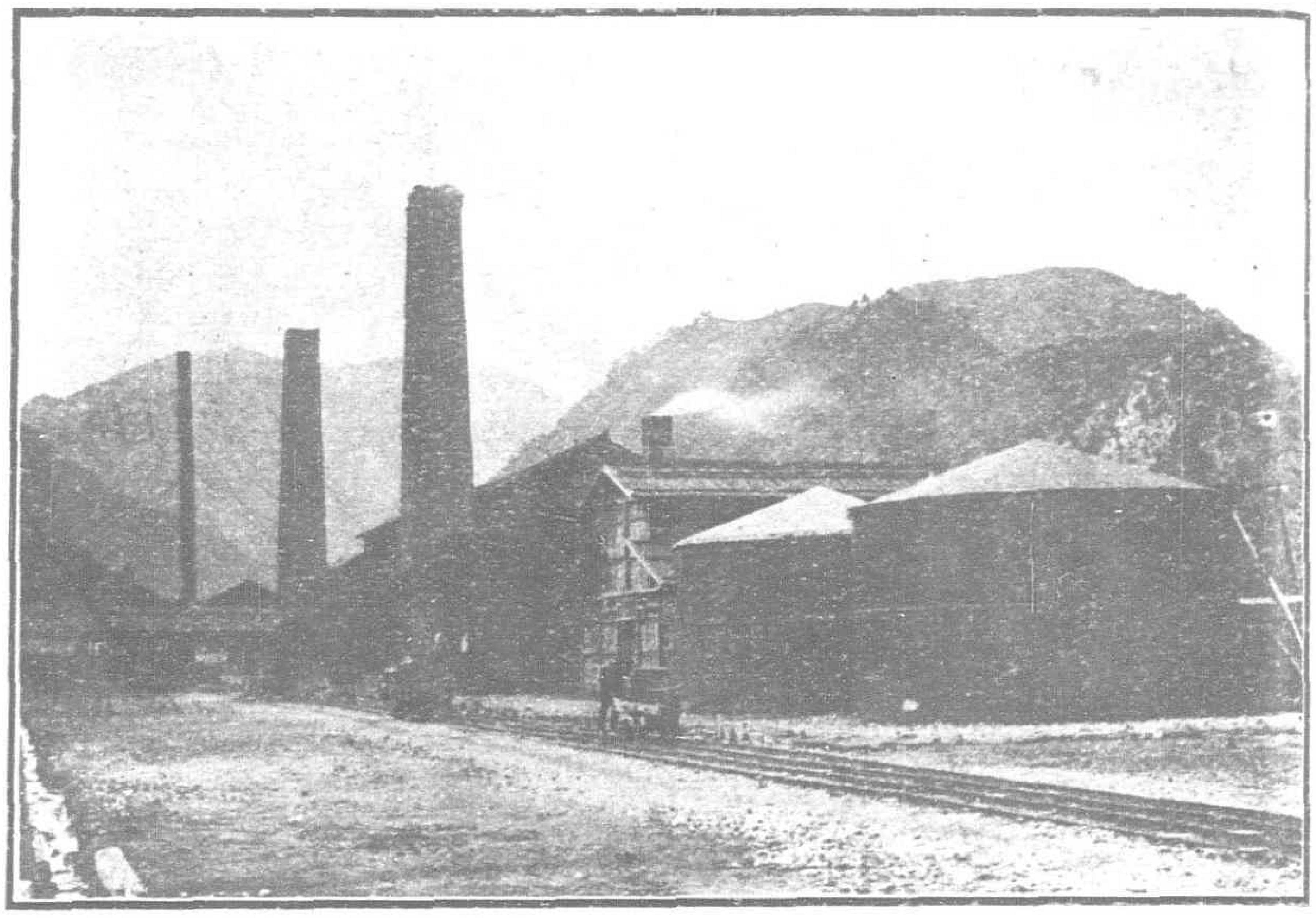
For the local transportation of timber, charcoal, linestone, etc., Bleihert double ropeway, Tamamura ropeway and Halidie ropeway are used.



COKE OVENS, FUKAGAWA COKE FACTORY



WIRE DRAWING SHOP, NIKKO COPPER WORKS



"MABUKI" HEARTH USING HEAVY OIL, KUSAKURA

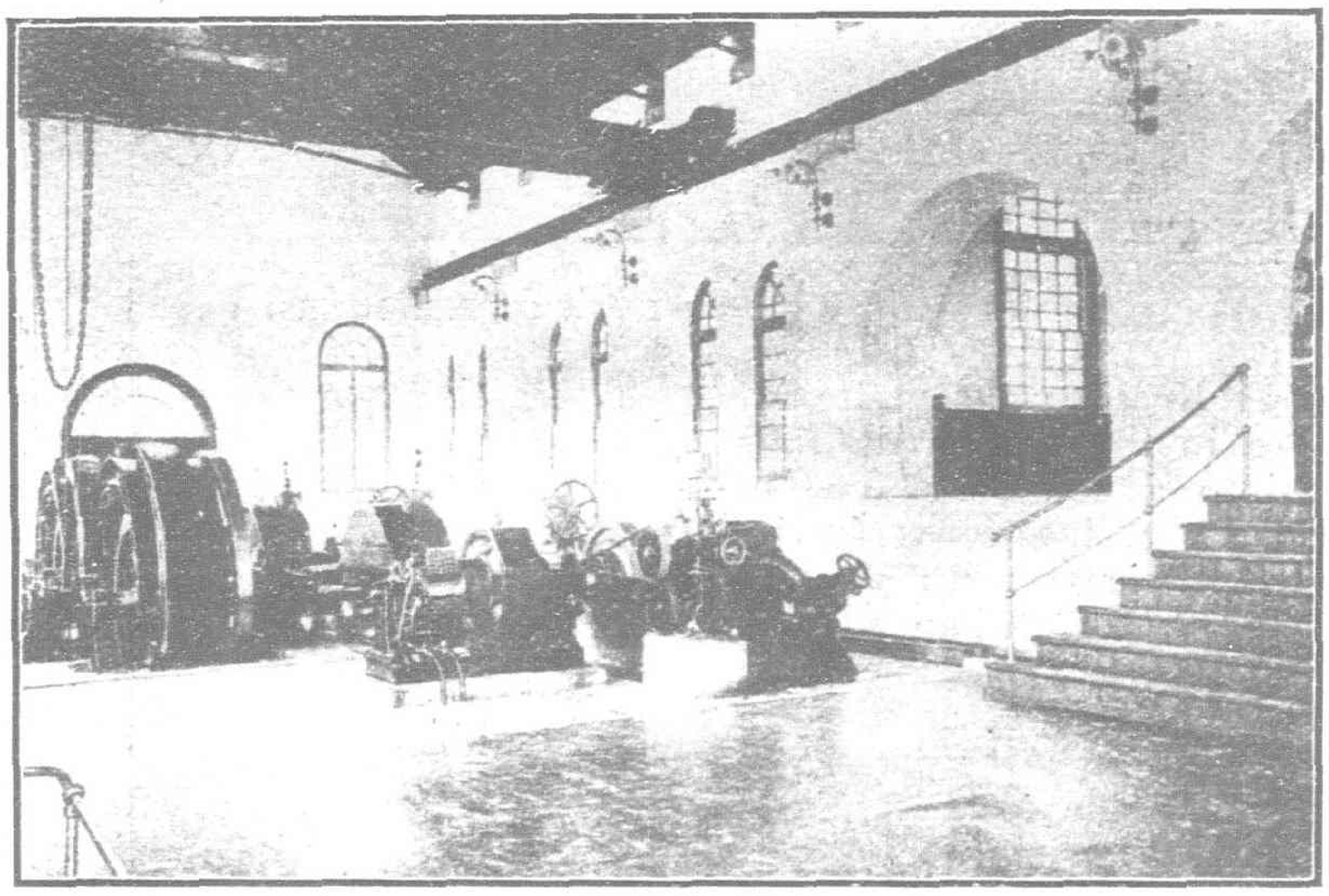
NIKKO COPPER WORKS.

The vicinity of Nikkō and Ashio are on the fringe of the median mountain range of Northern Japan. It is very near the Kwantō Plain, and water power can be secured in abundance. Under such conditions, the Nikkō Copper Works were established in 1905 just on the way from the Ashio Copper Mines, so as to afford facilities not only for the taking of the bessemer copper from Ashio, but the transportation of the materials for the works.

The bessemer copper from Ashio and the blister copper from the other mines of the Furukawa Mining Company containing silver and gold, are refined by electrolytic process, and the noble metals separated. The blister copper which does not contain silver and gold is refined in a reverberatory furnace.

The works produce annually 5,000 tons of copper wire, 2,000 tons of copper ingots, 500,000 ozs. of noble bullions, etc.

Reverberatory Refining. The bessemer copper and the blister copper, containing silver and gold, are refined and are cast into cakes for rolling to make an anode for the series process.



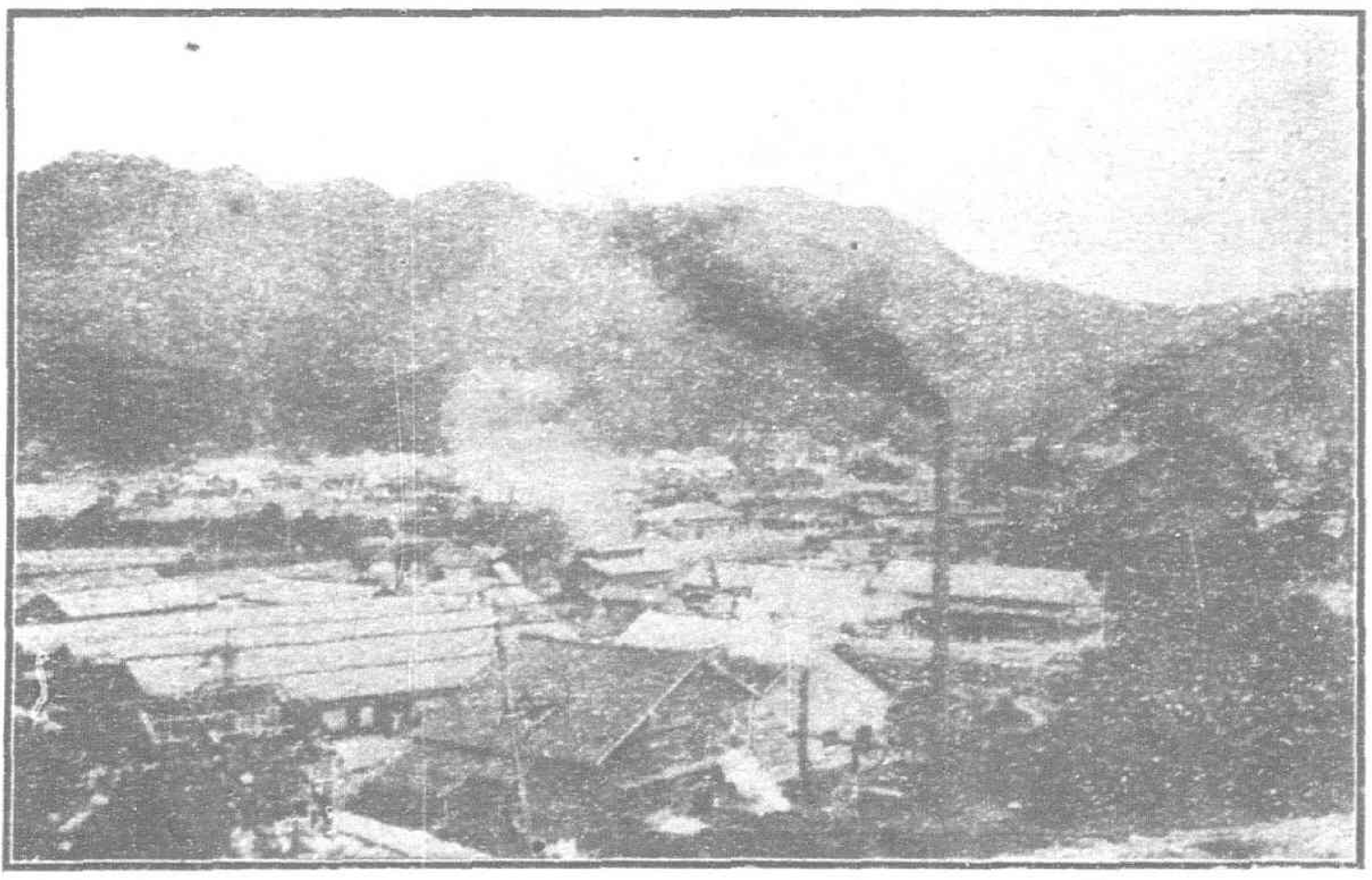
INTERIOR OF HOSOO POWER HOUSE, NIKKO

The blister copper without silver and gold, is refined and cast into ingots which average 99,7% copper. There are four furnaces, two of which have casting machines, and the capacity of each furnace is from 40,000 to 55,000 lbs.

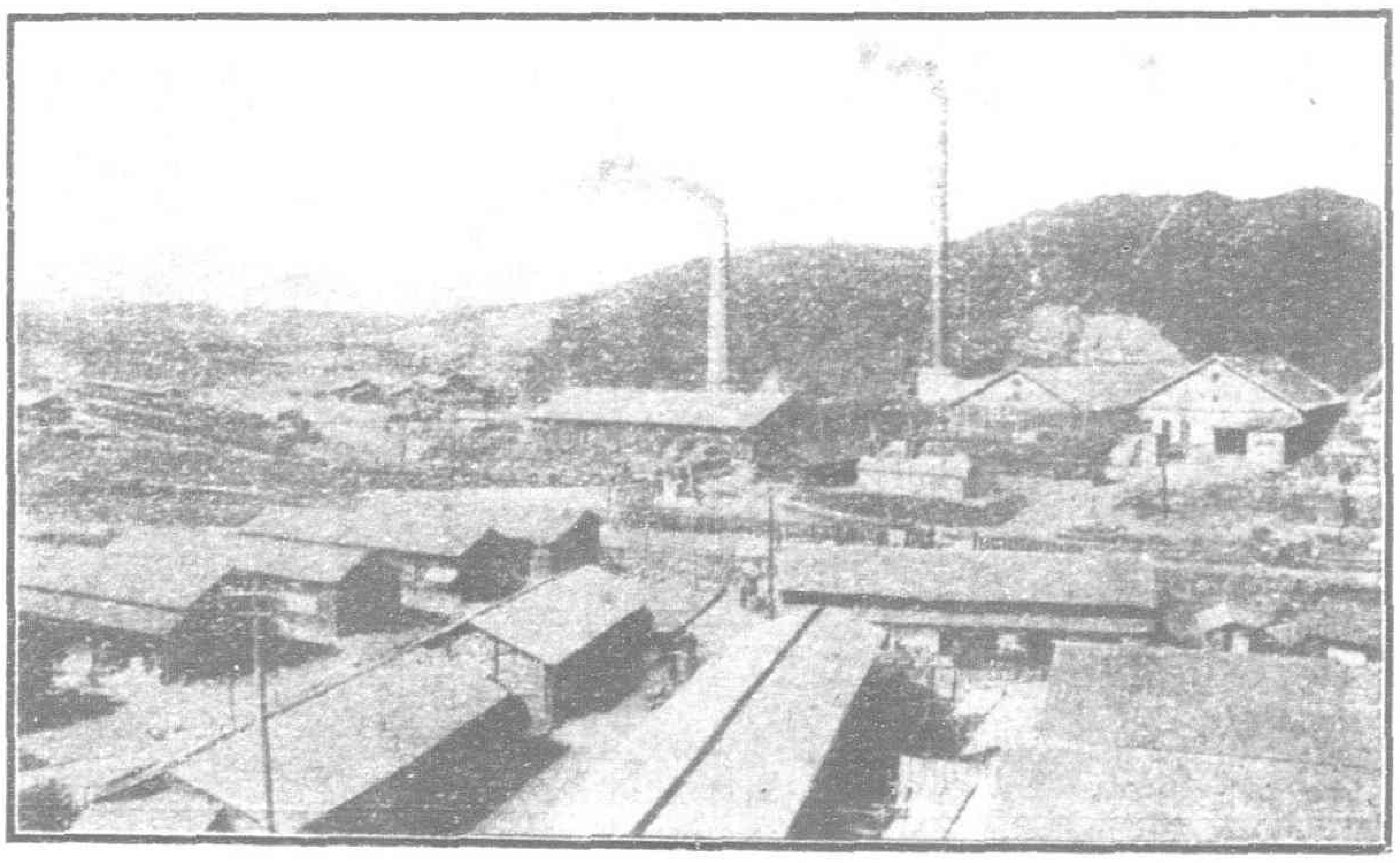
Electrolytic Refining. Here in this works, the series process of electrolytic refining is adopted. The copper cakes are rolled to ¼ inch and 12 inches wide. The plates are cut off into pieces of 24 inches long, and are sent to the electrolytic tanks (234 in number).

The anode slimes, collected in the tanks, are treated with sulphuric acid, and washed with water, and dried. The dried slimes are refined by English cupellation and cast into noble bullions.

(To be continued)



SHIMOYAMADA COLLIERIES

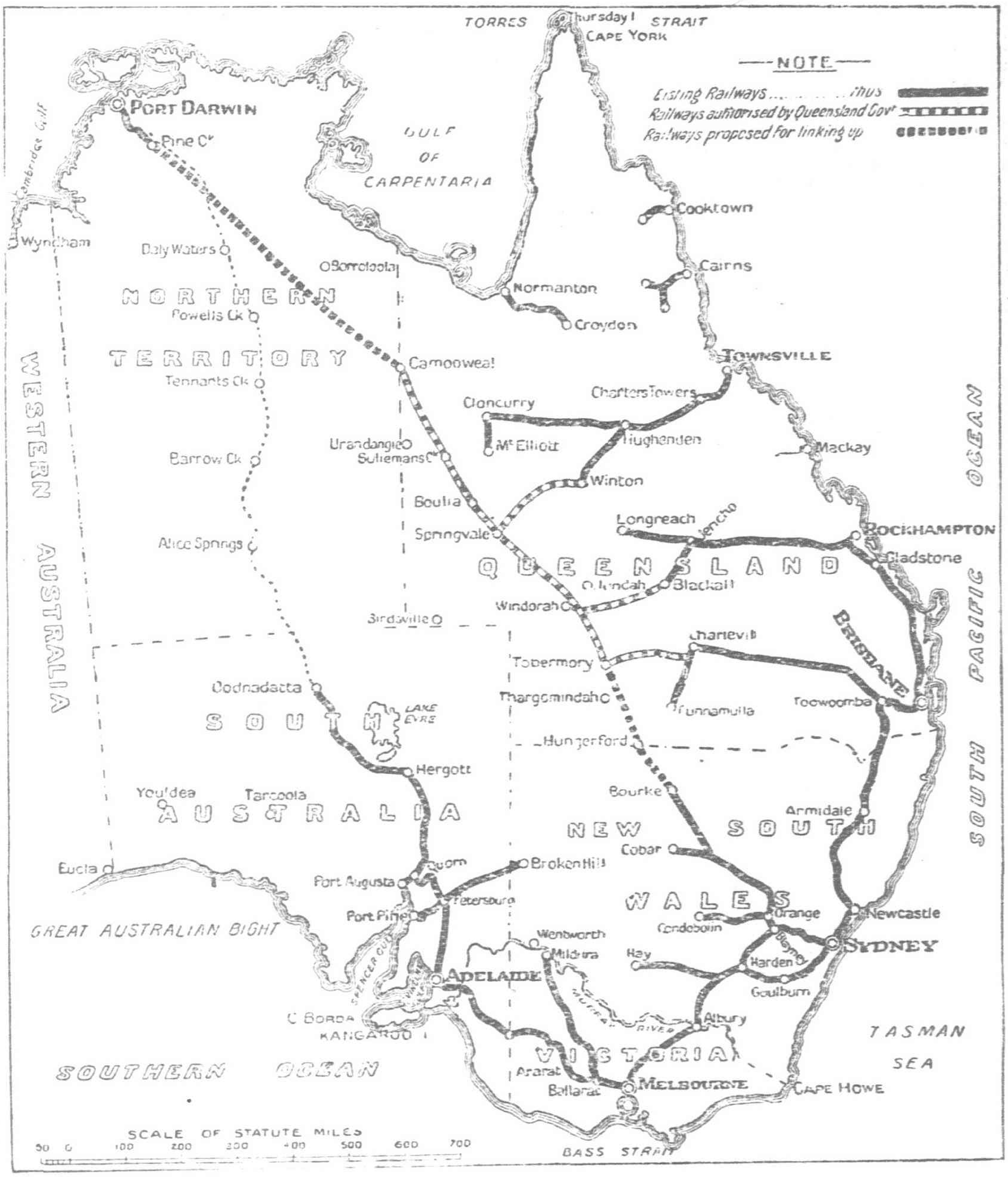


SHAKANOO COLLIERIES

RAILWAY NEWS

THE TRANS-AUSTRALIA RAILWAY.—The absence of any great water-ways in Australia renders the people of the Commonwealth practically dependent upon the railroad for internal communication. Unfortunately, in the early days of railway construction in Australia each colony followed it its own devices in regard to gauge and locomotive and rolling stock types, and there was no co-operation in the choice of route with the object of securing the best intercolonial service. These conditions prevail to this day and, as there seems little likelihood that the Commonwealth will be able to take over the railways, it is to be feared that they will endure for a long time to come. A glance at the map reproduced elsewhere will suggest even to the layman that the New South Wales lines were built on a perfectly haphazard system, the one definitive object being to bring all the traffic to Sydney. Queensland, on the other hand, has proceeded on a predetermined plan of pushing her lines inward from the coastal ports, and when the new construction that was authorized last year, and is to cost £6,000,000, is completed, the northern state will have the most effective system of railways in the Commonwealth.

The inauguration of the Commonwealth developed in Australia a national spirit, one of whose manifestations is the interest that is taken in works of national magnitude. In the old days, when the States were Colonies, the outlook both of the politician and the man in the street was restricted by the intercolonial boundaries. Parochialism is dying hard, but the Australian is learning to look at things from a national viewpoint. Since the Russo-Japanese War he has thoroughly awakened to the fact that Australia has concentrated her population in the corner of the continent most remote from danger and has left the north coast practically unsettled and undefended. It is from the north that the Australian has convinced himself that attack will eventually come, and he has taken steps to meet the danger, first by instituting a system of compulsory military training and secondly by deciding upon the construction of a railway to connect Port Darwin with the cities of the east and south. Inevitably, however, conflicting State interests rendered the selection of a route a matter of considerable difficulty, and to this is due the fact that up to the present the line has remained a pious aspiration. There are not wanting signs that the period of inaction is nearly at an end. The Press of Australia is giving constant attention to the question; the Sydney "Bulletin" deserves special recognition in this connection as it has for years past been doing its utmost, in season and out, to get the work taken in hand.



MAP OF AUSTRALIAN RAILWAYS

The map we publish elsewhere shows the two routes that have been suggested. When the Northern Territory was administered by South Australia the trans-continental line was always kept in view and the section from Adelaide to Port Augusta was pushed up to Codnadatta. In the north also a beginning was made and the track was laid from Port Darwin to Pine Creek. The finances of South Australia, however, could not stand the strain that would be involved by constructing considerably over 1,000 miles of railway through country for the greater part barren and waterless, except by having recourse to the land grant system. There is in Australia a profound distruct of this system and although suggestion in regard to its adoption were tentatively made, the proposals never came fairly within the sphere of practical politics. After federation South Australia recognised that there was an excellent opportunity of getting rid of the Territory, which was to her merely a financial incubus, and she therefore offered to transfer it to the Commonwealth. This offer, after some delay, was accepted and the Territory is now administered by the Australian Government. Opinion in South Australia holds that there is a moral obligation upon the Commonwealth to continue the lines in the north and south started by South Australia. New South Wales and Queensland, however, claim that both strategically and commercially a line connecting the eastern cities with Port Darwin would possess paramount advantages over that running north and south. It is intended in this article briefly to outline the arguments that have been brought forward to support this point of view.

Sydney, though the Commonwealth Constitution provides that it cannot be the political capital of the Commonwealth, is undoubtedly the commercial capital. The population is even now well over 600,000 and is increasing more rapidly than that of any other Australian city. Similarly New South Wales is the most populous and wealthiest of the Australian States. When the citizen army is fairly established it will be in New South Wales that the greatest number of troops will be available for despatch to any threatened point. As the north is the only quarter from which danger is apprehended it is argued that a line as direct as the topographical features of the country will permit should be constructed between Sydney and Port Darwin. Similarly it is claimed that commercially such a line would be more profitable than that running north and south Passenger and goods traffic would necessarily be heavier between Sydney and Port Darwin than between Adelaide and Port Darwin.

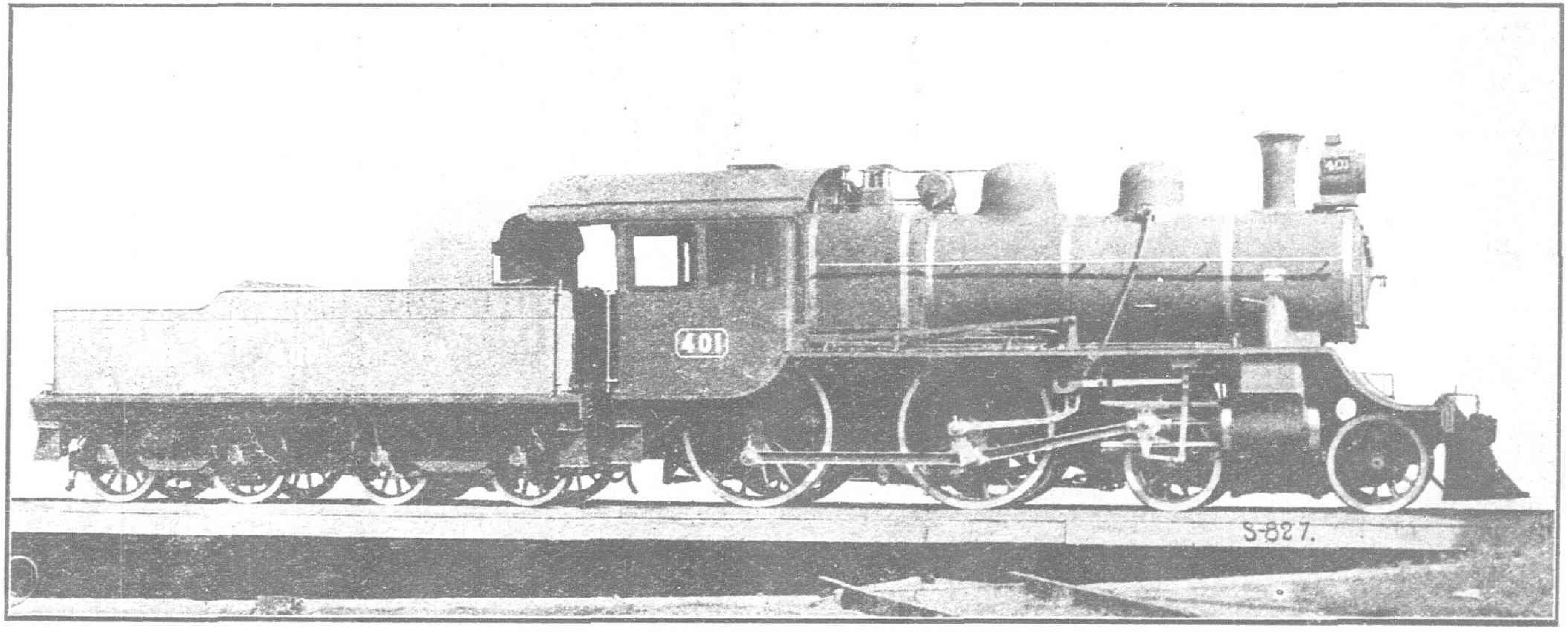
The Governments of New South Wales and Queensland have agreed to join forces to ensure the construction of the line running from Bourke to Hungerford on the southern boundary of Queensland, thence to Camooweal on the western boundary and from Camooweal to Pine Creek. The first section would be constructed by New South Wales, the second by Queensland and the third by the Commonwealth. The distance between Bourke and Hungerford is 120 miles and the country is generally flat. The Queensland Parliament has already authorised the construction of the line from Tobermory to Camooweal and has tacitly agreed to bridge the gap between Tobermory and Hungerford. The section left for the Commonwealth to construct, that between Camooweal and Pine Creek, is about 640 miles in length.

If the north and south route were adopted the Commonwealth would have to construct 1,067 miles of railway through mostly desert country. But passengers and goods traffic from Melbourne, the second most populous city in the Commonwealth would benefit, as the distance from Melbourne to Port Darwin by the Adelaide route would be 2,379 miles, against 2,463 by the Sydney route. This route would therefore probably be favoured by the Government of Victoria, but the difference in length is so trifling that the advocates of the line from Sydney feel convinced that its other advantages will secure its endorsement by the Victorians.

It may be of interest briefly to recapitulate the main arguments which have been advanced in support of the Sydney-Tobermory-Port Darwin route:—

The largest centre of population, Sydney, would naturally supply the largest number of citizen soldiers, and if connected with the far north by a direct route, in time of war would be able to render most assistance.

In time of war Sydney being the most important of the State capitals, may stand in the greatest danger of being attacked, and that at a time when large numbers of the Australian soldiers might be massed in the Northern Territory. The most direct route for the transport of troops would then be of the greatest value.



Eight-wheel Express Passenger Locomotive recently built by the American Locomotive Co. for the Imperial Government Railways of Chosen. This locomotive is hauling a load of 245 tons, behind tender, over one per cent grades at speeds of 35 and 40 miles per hour Its principal dimensions are as follows:—Cyls. 18"× 26", Diam, of driving wheels 72". Heating Surface 1397 sq. ft., Grate area 25.2 sq. ft. Tractive Power 17,900 lbs. Weight on drivers 72,200 lbs., Factor of adhesion 4.03. Tender Capacity 3200 Imp. Gals. 300 cu. ft. coal.

The direct route to Sydney would provide the setters in the north with their best market.

Sydney being the most populous and wealthiest centre of Australia, if connected by a direct route, would furnish more capital and enterprise for the settlement of the north than any other centre of population in Australia.

Sydney being the greatest commercial city of Australia would naturally for that reason and from its geographical position, do most trade with Java, Singapore, China, Japan and other Eastern markets. Its direct connection by rail with Port Darwin, the last port of c ll for steamers in the north, would therefore be of great service.

If the through line goes from the principal centre of population and through the best country practicable, it would enable those who work it to provide the quickest and best train service, and the route that has the quickest and best train service will attract the most traffic, and be of the most service in the transport of mails to the north and east.

If the line were made from Sydney the distances by rail from the principal centres of population would be as follows:—

First, from Sydney via Bourke, etc., to Port Darwin would be 2,173 miles, as against 2,966 miles if the route is via Adelaide. Second, if the Sydney through route is adopted, Brisbane by rail to Port Darwin would be 2,005 miles, as against 3,691 miles if the Adelaide route is adopted. Third, if the Sydney route were adopted passengers by train from Rockhampton could reach Port Darwin by 1,950 miles travelling, as against 4,084 miles if they had to travel via the Adelaide route.

If the Sydney route were adopted it would best serve, taking the last census returns, the population of New South Wales and Queensland, numbering 2,252,547, as against the population of Victoria and South Australia, numbering 1,724,109.

If the route via Adelaide and Codnadatta were taken it would be for 1,067 miles (which has yet to be made) through mostly desert country with only in parts 4½ in. average rainfall per annum and consequently capable of very little production of traffic. If the Sydney-Bourke-Camooweal scheme were adopted it would be found that for nearly the whole distance the line would traverse excellent pastoral country, with in no case a rainfall as low as 4½ in.

If the Sydney route were adopted the Federal Government would only have to make about 640 miles of railway as against 1,067 miles if the Adelaide route were adopted.

The distances given are approximate, but are near enough for all practical purposes.

CHINA

Sunning-Kongmoon Railway.—The extension of the Sunning Railway in Kwangtung Province, China, to Kongmoon has been completed.

The road is now 67½ miles long, from the river port of Kongmoon to the internal of one of the richest portions of the Pearl River delta. It has been constructed by Chinese without foreign assistance, much of the money for the railway being furnished by Chinese in the United States. Its equipment at present consists of 7 American and 5 German locomotives, 18 passenger coaches built in America, and about 70 box cars and about 70 flat cars of the usual American model, most of which have been constructed in the United States. The extension of the railway north from Kongmoon and eventually to Canton and south from Sunning City to the sea is to be undertaken as soon as affairs in this portion of China return to normal. The company owning and operating the line may be reached through Mr. Chin Kee Hee, president of the Sunning Railway Co., Hongkong or Sunning City.

Canton-Swatow; Project.—Our Canton correspondent, writing on May 9 says the South China Post states that a project is on foot to construct a railway connecting Canton and Swatow.

When General Chan Kwing Ming was a member of the Provincial Assembly under the old Government, he laid before the Assembly a proposal to build a railway from Canton City to Chiuchow, and Mr. Cheung Pat Sze, a well known millionaire, engaged a European engineer to make a survey of the line. As this was too big a task to be brought to a successful conclusion, as merchants were handicapped by the red-tape proceedings of the mandarins, the question was put off from time to time. As soon as Mr. Chan Kwing Ming came into power he caused the question to be revived. He put the matter in the hands of Mr. Chao Ching Hua, managing-director of the Canton-Kowloon Railway, and Mr. Shing King Hsun, managing-director of the branch line of the Canton-Hankow Railway to canvass for shares. It is proposed to float a company with a capital of twenty million dollars and the railway is to connect the Canton-Kowloon Railway at Shek-lung at one end, and the Chiuchow-Swatow Line at the other, passing through Waichow, Hoifung Jukfung and other districts at Chiuchow. It is believed that as soon as this line is completed the Canton-Kowloon Railway will become more of a paying concern.

Canton-Hankow Railway.—Arrangements have been completed for the beginning of survey on the Wuchang-Yochow section of the Canton railway, and it is expected that the first survey party will be out early this week. Other parties will follow as soon as camp equipment arrives from Shanghai. It is expected that this part of the work will go through rapidly as there will be three parties out, each with six foreign engineers. In addition twenty native engineers will be engaged—five who passed the examination last year as assisted engineers, and fifteen others as student engineers.

Shantung Railway Co.—Berlin, May 1.—The Shantung Railway Company has declared a dividend of 6 per cent., preferential shares receiving a further dividend of 5 per cent.

CANTON-MACAO RAILWAY.

The destiny of the Canton-Macao Railway lies with a group of local Chinese, who are now advertising in native papers for capital with fair success. The route has already been surveyed and it is probable that construction work will be commenced at an early date. Starting at Fati, across the river from Canton, the line will run almost due south, through the districts of Shuntak and Heungshan, to the boundary of the Portuguese colony of Macao. It will be about 70 miles long and will penetrate one of the richest districts of South China.

The country through which it passes is low lying, intersected by innumerable creeks and given over to rice, fruit, and vegetable culture. A 30-mile branch will connect the main line at Chentsun with the Sunning Railway at Kongmoon, via Kaukong.

Territory Served—Exports and Imports.—There are no very large cities on the railway, but there are innumerable villages and several towns of 10,000 to 50,000 people, among which may be mentioned Chentsun, Shuntak, Heungshan, Chingshan, Kamchuk, and Kaukong, the last two of which are ports of call for foreign steamers plying on the West River. The southern terminus of the main line will be within 5 miles of the new commercial port of Heungchow, now in process of construction, and will undoubtedly have some effect in hastening the completion of that pretentious scheme.

The people of the Shuntak and Heungshan districts are wideawake and progressive, and have come under the influence of a large number of Chinese returned from abroad. There are probably no richer districts agriculturally in China.

So dense, however, is the population that large quantities of rice have to be imported from abroad to help out the local crops. Sugar cane is grown on a considerable scale and turned into brown sugar for local consumption and export. Among the other manufactured articles exported from the districts touched by the railway are palmleaf fans, mats and matting bags, groundnut, cassia, and bean oil, samshu, coarse chinaware, paper, and firecrackers. Animals shipped alive for slaughter, poultry fresh and preserved, fresh fruit, dried and salted turnips and other vegetables, native medicines, and firewood may be said to complete the list of major exports.

The principal imports are kerosene, cotton and woollen piece goods, raw cotton and cotton yarn, matches, timber, metals, coal, saltpeter, foreign clothing and hats, shoes, umbrellas, sugar, dried and salted fish, flour, vermicelli, and macaroni.

Trade Expansion.—The natives of this section originally used, and to some extent still use, groundnut and other native oils for illuminants, but the steadily increasing sales of kerosene point to an early disappearance of the native article. The market for cotton piece goods is considerable, but apparently not growing. The people prefer native woven cloths for all uses to which they can be put, and the steady increase in the number of cotton mills in China, supplemented by innumerable hand looms, bids fair to make any expansion in the local market improbable. There is, however, a good market for foreign-made clothing, hats, caps, and other haberdashery, shoes, etc.

The taste for things foreign is not confined to clothing but extends to many articles of personal adornment and to condiments and provisions, including tinned fruits, vegetables and meat, wines and liquors, cigars and cigarettes, and condensed milk. A small cigar factory, using locally grown leaf, has recently been started in the territory served by the railway, a factory for putting up a local fish has been operated for some time in Macao, and several factories for tinning rice-birds, bamboo shoots, and lichees, carambolas, and other Chinese fruits have been erected within short distances of the line.

At the present time the only means of transportation and communication are boats on the innumerable creeks which intersect the delta, and wheelbarrows on the little paths which delimit the paddy fields. Both of these will remain as valuable feeders to the railway, but they will pass out of existence as means of communication between intermediate points and termini. The district draws upon Canton, Macao, and Hongkong for its foreign goods, and the completion of the railway will bring all these places incomparably nearer to it. The new line will also afford the people a wider market for their fresh fruit, vegetables, eggs, and other perishable articles. (C. R.)

THE CANTON-AMOY RAILWAY.

The construction of a railway from Shekwan, across the East River from Shek Lung on the Canton-Kowloon Railway, to Amoy has been under consideration for a number of years, and in 1906 a survey of the route was made. The line is to be built by Chinese syndicates representing the people of the two Provinces through which it will pass—Kwangtung and Fukien. No advance has been made beyond the survey of the line, and it is probable that some years have still to elapse before construction work actually commences. The line will have a length of 275 miles in Kwangtung and about 100 miles in Fukien. It will penetrate a thickly populated country in a high state of cultivation, and will bring rail communication to several important cities now served only by inferior waterways.

The western terminus, Shekwan, is a busy town of some 10,000 people, drawing its importance from its situation at the apex of the East River delta, opposite Shek Lung, which has a population of about 20,000. It shares with Shek Lung in the distributing trade of the delta and of a large area along both sides of the river to the east. The country about it is fertile and is devoted largely to the cultivation of rice, and bananas, lichees, and other fruit, and sugar and cattle and swine raising. From Shekwan the route follows a general easterly direction, through Waichow, to Louk Fong, and then striking north-by-east touches Kityang and Chaochowfu. From the latter place it takes at first a southeasterly and then a northeasterly direction to Wong Kong on the Fukien border. At Chaochowfu it crosses the Swatow-Chaochowfu Railway, giving it rail connection with the sea at that point.

A Populous District.—The first important city reached after leaving Shekwan is Pok Lo (with 100,000 inhabitants), whose trade has been overshadowed by that of Waichow which has a population of 300,000. At Waichow the East River turns abruptly to the north and runs for over a hundred miles through broad and fertile valleys, thickly settled and well cultivated. To this fact is largely due the importance of Waichow, which serves commercially both this valley and that south of the river. The principal products of this section are rice, fruit, swine, and poultry. Small craft feed the city's trade from the north, while boats drawing up to 3¼ feet can reach Waichow from the delta except during the season of low water. The completion of the railway will doubtless be followed at an early date by the opening of Waichow to foreign trade, as provided for in the British commercial treaty of 1902.

The line leaves the river at Waichow and runs to Hoi Fong through a hilly country interspersed with valleys and dotted with towns and villages. Of the latter only Ping Sang, Sam To Chou, Ko Tam, and Kung Ping need be mentioned. These are market towns, each serving its little valley or two and each with a population of about 10,000. Hoi Fong and Louk Fong are walled towns of 10,000 inhabitants each; both can be reached from the sea by small junks. All the way from Waichow to Louk Fong fruit, rice, and cattle are raised and small timber cut. At Louk Fong the line turns to the northeast and after passing Kwoi Tam, a walled market town of 10,000 people, and Pou Ning, a walled city of 100,000, reaches Kityang. This section is through more level country where cattle, pigs, poultry, and water buffaloes are raised; and rice, fruit, grain, and sugar grown.

Many Small Towns Along the Route.—Before Pou Ning is reached the country becomes thickly dotted with small villages and towns. It is a rich agricultural district. The city of Pou Ning lies on a tributary of the Swatow River and is accessible by small craft. Its importance is overshadowed by that of Kityang, however, which stands on the river itself and can be reached by boats drawing up to 10 feet. Kityang, with a population of 400,000, is a walled city upon which a large area to the north depends for its supplies, which this city in turn gets from Swatow.

From Kityang the line passes through a well-cultivated district to the prefectural city of Chaochow, population 500,000, situated on the Han River and connected with Swatow by a short railway constructed some years ago. Chaochowfu is an important collecting and distributing center for the Han Valley and considerable areas on both sides of it. Its foreign port is now Swatow, but with the completion of the line from Canton it will be able to draw easily upon Amoy as well as upon Hongkong and Canton itself.

There are no further important towns until Wong Kong is reached. This city with a population of 60,000, lies just within the provincial border and has a considerable trade in oranges and other fruit, indigo, vegetables, rice, sugar, cattle, and dried fish. It has water communication with the sea for craft drawing up to 1 foot only. The railway should find a market for its produce at Amoy, Chaochowfu, and Swatow.

What the Railway Means to Trade Interests.—It will have been observed that practically all the country through which the line from Canton to Amoy passes is agricultural, and so far without important manufactures; that, in other words, the purchasing power of the people is dependent upon the success with which they market the produce of the soil. The slow transport service offered in the past by native boats has made it impossible to go any distance from the fields to market and has seriously restricted the area of sale. It stands to reason that when Chaochowfu and other places along the line can ship their perishable fruit, vegetables, etc., to Canton, Hongkong, and Amoy by rail in a shorter space of time and more cheaply than they can now ship them a tenth of the distance by boat, only indifference on the part of the people themselves can prevent the inauguration of an era of increased prosperity.

It will have been observed, too, that the people who will be served by the railway, while able to feed themselves on fruit and vegetables, are dependent upon others for their clothing, many foreign articles of food, cotton and cotton yarn, illuminating oil, and coal (where it is used for fuel) besides many other articles known as sundries. These are now obtained from the open ports of Swatow and Canton or direct from Hongkong by junk at, in every case, a much greater expense than would be involved in importing them by rail. The people of this section have taken kindly to many foreign articles—some necessaries, some luxuries; and, given a greater purchasing power, there is every reason to expect an increase in the demand for foreign imports. (C. R.)

CHINESE RAILWAY PROJECT

At the instance of the consulate general in Hongkong, several American manufacturers of railway material have sent a representative to Mengtze and Yunnanfu (both cities in the Province of Yunnan), and two important locomotive companies also have men on the ground, in connection with the contract to construct the proposed line from Yunnanfu to Lanchowfu, on the Yangtze River, in the Province of Szechwan. The matter of freight rates, however, over the French railway from Haifong, in French Indo-China, to Yunnanfu, is of such controlling importance that the projectors of the line are seriously considering the construction of a line from Yunnanfu to Nanning (on the Yoo River in the Province of Quang Se), as a means of avoiding these excessive charges, as well as opening up the Province of Yunnan and west China by the new route. This road would give communicatien by rail and water with Hongkong and Canton.

This enterprise is not exactly an alternative of the construction of what is known as the Szechwan Railway, but it seems to be generally understood that the construction of the Railway to Nanning will postpone the construction of the line from Yunnanfu to the Yangtze. The survey work of the line to Nanning is now (November, 1911) being rapidly completed and the immediate construction of either the Szechwan Railway or the line to Nanning seems to depend entirely upon the early settlement of political disturbances in China generally. The detailed survey of the line from Yunnanfu to Lanchowfu, under the direction of two American engineers, is also rapidly nearing completion, the preliminary work already having been disposed of.

TRADE ROUTES INTO YUNNAN.—Hongkong importers who expected a revolution in the trade of Yunnan and Kwangsi Provinces in South China as a result of the operation of the railway from Haifong to Yunnanfu, have come to the conclusion that under present conditions much of the expected expansion will prove impossible. There has been a considerable increase in some lines of trade into and from these Provinces, but the increase has been due, to some extent at least, to generally improved conditions and mining and other internal development in the Provinces, and in spite of drawbacks due to railway conditions. The usual direct results of railway service have been minimized by interrupted service, troublesome customs and other charges, and particularly by high freight rates.

In spite of the opening of the railway, goods are still imported into Yunnan, Kweichow, and west China by rail through Burma, thence by pack train to Bhamo and on to Tengyueh, and then to Batang, about 400 miles north, or to Talifu, and even to Yunnanfu, whence the goods are distributed all over that part of the country, as they have been since the beginning of the trade. These costly means and tedious routes are used in spite of what would seem to be the manifest advantages of the rail route to Yunnanfu or to intermediate points and thence by the natural caravan routes to various points in the Province and west China.

The expected change in the direction of these imports has so far not been realized, and present indications are that the railway transportation charges over the line to Yunnanfu will have to be modified before any change can be reasonably expected. These charges bear with particular weight upon all great undertakings for the development of the country like railways, mining enterprises, factories, and, in short, all enterprises which require heavy machinery and a reasonable rate for the transportation of supplies or output.

INTERRUPTED RAILWAY SERVICE—HIGH FREIGHT RATES.—The construction of the line into Yunnan has been too light for the nature of the country, the result being that the operation of the line has been interrupted between French territory and Yunnanfu for the greater portion of the time. Rainfall in some portions of the territory traversed is particularly heavy and the grades have been established largely by the use of a peculiarly light decomposed granite which has readily been swept away by floods. It has become evident that considerable work in reconstruction will have to be done before regular and uninterrupted service on the railway can be relied upon. This, of course, has had considerable effect in restricting the use of the railway and in retarding the development of the country.

The chief cause for the latter, however, is in railway rates. These rates are upon five classes of freight and are assessed upon the basis of five zones between the seaboard at Haifong and Yunnanfu. The rates are based upon considerations of comparative value and comparative bulk of goods as well as weight, and in general follow similar classifications in France. They vary from 11 to 26 cents local currency (4.73 cents to 11.18 cents gold at present exchange) per metric ton (2,240 pounds) per kilometer (0.62 mile) for the higher class of goods to 4 to 10 cents local currency (1.72 to 4.3 cents gold) per metric ton per klometer for the lowest class of goods. To the present rates a surtax of 10 per cent is now added on the ground that exchange is low, but this surtax will be removed when the local dollar will equal 50 cents gold. On the basis of the rates fixed in the regular tariff the charges on the different sections for the several classes of goods amount to the following in gold dollars per metric ton:

Sections	Distance	Class 1	Class 2	Class 3	Class 4	Class 5
	Miles					
Haifong to Yenbay.......	104	$11.73	$9.60	$9.60	$5.33	$4.25
Yenbay to Lao-kai.........	87	7.28	5.92	4.58	3.64	2.73
Lao-kai to Mengtze.......	111	19.90	16.07	12.25	9.95	7.65
Mengtze to Annchou....	27	2.40	1.95	1.48	1.20	.93
Annchou to Yunnanfu..	152	13.65	11.02	8.40	6.82	5.25
	481	54.96	44.56	36.31	26.94	20.82
Surtax..........................	....	5.50	4.45	3.63	2.69	2.08
Total..........................	....	60.46	49.01	39.94	29.63	22.90

EXTRA FEES.—The rates on various classes of goods from Haifong to Yunnanfu, therefore, a haul of 481 miles, range from about $23 gold to over $60 gold per metric ton. To the rate of $23 to $60 per ton from Haifong to Yunnanfu, the railway company adds a charge of about $3 local currency, or $1.30 gold, as a "customs" charge, which seems to be designed to cover the clerical expenses of clearing goods through the Indo-China and the Chinese customs. The charge has, however, no actual connection with the customs duties, and is independent of the duties levied either in China, where 70 per cent of the usual Chinese customs duty is collected or in Indo-China, where 20 per cent of the full import duty on goods from abroad is collected as a transit tax on goods thus entering China. The freight rates above given are modified somewhat by rates for carload lots, but are increased for goods of a dangerous nature, considerable quantities of which are used in railway construction and mining enterprises.

In addition to freight on the long ocean haul from the United States to Haifong, the freight on rails from Haifong to where they are needed is about 150 per cent of the actual price of the rails in the United States.

INDO-CHINA AND SOUTH CHINA RAILWAYS.—The project of Chinese governmental authorities and Chinese business men to connect the interior of Yunnan and Kwangsi Provinces with the seaboard by a railway from Yunnanfu to or near points more or less within the vicinity of Nanning, on the West River, as an alternative route to the route now had by rail through Indo-China and over the French railway into Yunnan, is likely to be hastened by plans of French railway interests in connection with trade now handled through the Chinese port of Lungchow and thence down the West River. According to the annual report of the acting commissioner of customs at Lungchow, Mr. P. C. Hansson, just published, "French aspirations to extend their Hanoi-Langson Railway to Lungchow and Nanning would appear to have been definitely abandoned." The commissioner continues:

> The line is, instead, to be pushed through French territory to Nasham, the uppermost navigable point on the Sungki River, which flows down past Lungchow. Farther down the river is a place called Binhdao by the French, Pingtu by the Chinese. Between this and Nasham the river makes a large bend, forming a sharp angle, with its top near Thatke; and it is urged in the Tongking newspapers that by extending the railway the few miles across from Nasham to Binhdao a saving in time of forwarding goods corresponding to the time it takes the junks to navigate the tortuous bend—at least four days on the upward journey and two days downstream—will be effected; also that Binhdao will then become the "real port" of Lungchow. The pushing of the Hanoi-Langson Railway to a point on the Sungki River reachable by junks was advocated as far back as 1889 by Mr. Commissioner Carl as a means of capturing the trade flowing down the West River from these parts, Poseh, and Nanning. Since then, however, great improvements have been effected in the West River route, a number of likin barriers have been removed, Wuchow and Nanning have been opened to trade, and a flotilla of motor boats now complete for the growing traffic above Wuchow. In oder to deflect part of this trade via Tongking, shallow-draft motor boats would have to run in connection with the railway, and cheap freights and the most liberal transit facilities by the Tongking authorities would be a sine qua non. Whether all this will be done remains to be seen.

FERTILE LAND AWAITING CULTIVATION.—The present trade involved in the development of either of these routes is almost altogether with or rather through Hongkong, but it is not large, and there is little hope of any material increase in it until there has been that development of the country by improved means of transportation these various plans promise. It is a fact of much significance in Chinese affairs that there are great tracts of land of fertility and promise in Kwangsi and Yunnan which are not peopled or cultivated. The commissioner says of this phase of the situation:

> The country is very sparsely populated, large tracts of land lying idle; a steady flow of settlers would be wanted to remedy this. To induce emigrants from Kwangtung to come here, rather than allowing them to depart for foreign countries, should be a task of national importance to China. First of all, however, improved means of communication within the Province would be necessary.

The completion of the French route to the river at Nasham or of the Chinese route to the river at Nanning or Poseh will open up a territory which is now practically valueless. The experience of the railway to Yunnanfu has, however, been that unless the railway rates are low the full effect of its construction and operation cannot be realized.

In the meanwhile and until the breaking out of the revolution in China motor-boat service on the rivers west and northwest of Nanning to Poseh was maintained and increased considerably. It will doubtless continue to be the most approved means of reaching this territory until railway service is finally realized.

KIRIN-CHANGCHUN RAILWAY.—Viscount Uchida's reply to the interpelation of Mr. Shiro Shiba, in the House of Representatives March 7th, 1912.

"What is the policy in relation to the Kirin-Changchun and Kirin-Hoiryong lines of railway in South Manchuria?"

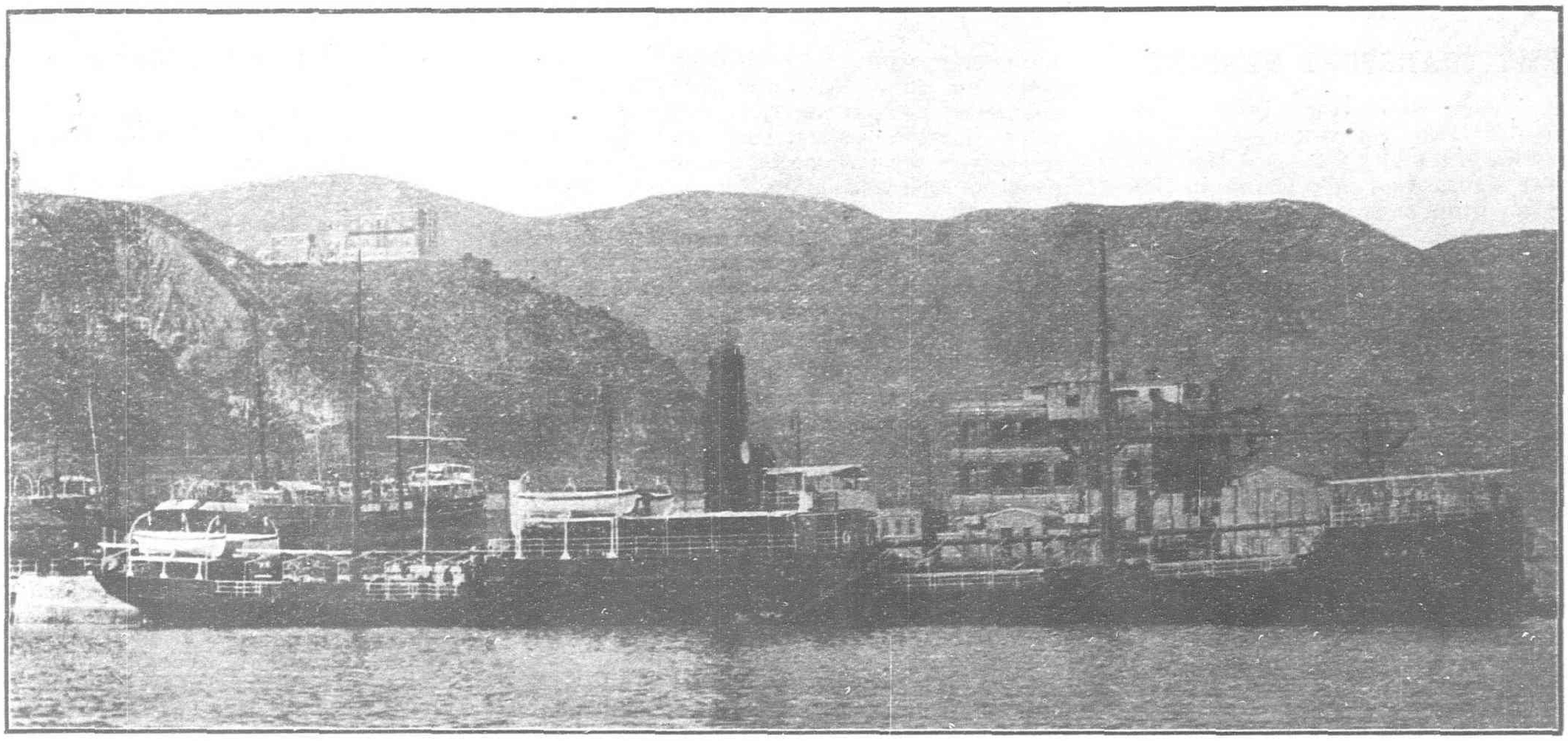
"The Kirin-Changchun line was to be constructed by China, and a connection made with the Japanese line. The construction was suspended by the outbreak of pest. An able manager of the undertaking had been difficult to find, while the Chinese officials and specialists engaged under a poorly qualified manager showed little skill and experience in the work. These defects were common to other railway lines undertaken by Chinese and not special to this line. Besides, the provisions for the position and power of the Japanese experts were defective, and this fact hindered their full activity. The line was an expensive one, having already absorbed 3,000,000 yen; but more than half its length had been completed, and only 33 miles were left incomplete.

In reference to the Kirin-Hoiryong line, the time for commencing its construction was to be fixed by the Chinese Government, after consulting with the Japanese authorities. A delay caused the Japanese Consul at Mukden to make inquiries and carry on negotiations with the Viceroy of Mukden. But the outbreak of the present disturbance put a sudden end to the affair."

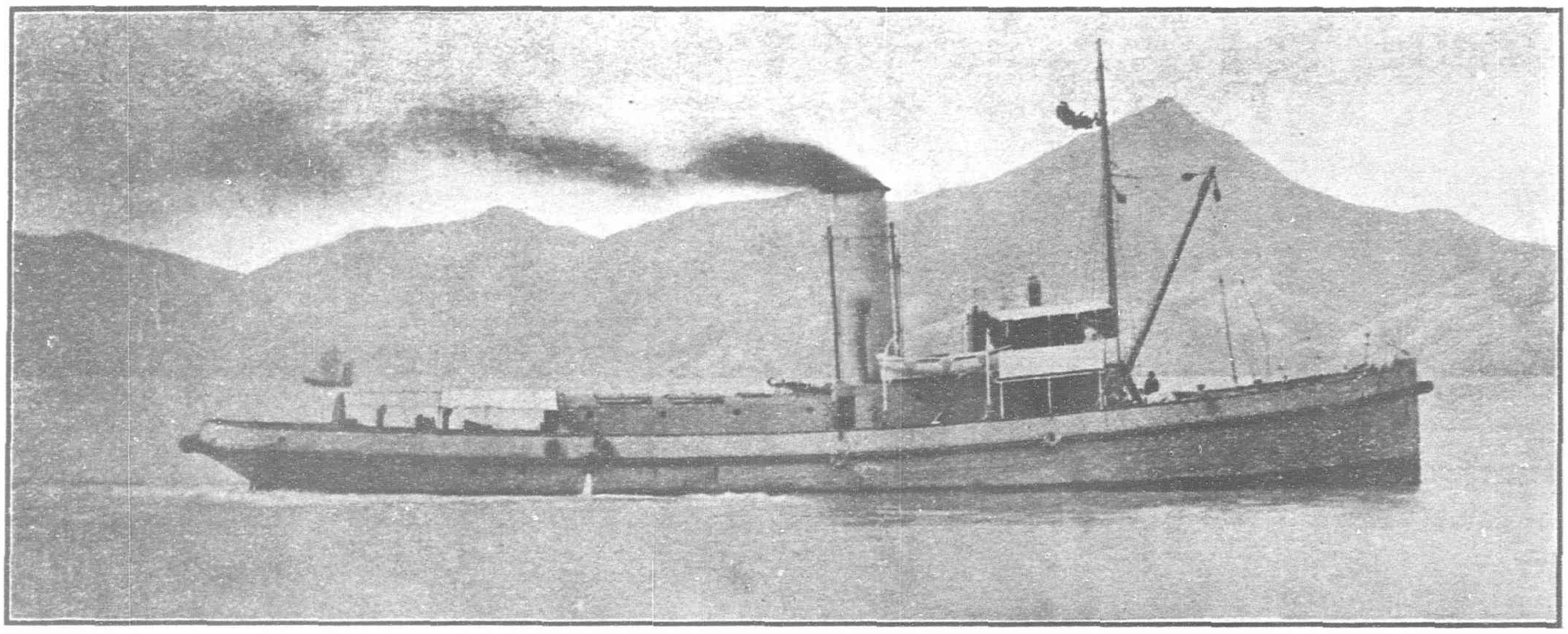
MUKDEN.—With reference to the agreement made last fall between the Japanese and Chinese authorities here for the extension of the track of the Imperial Railways of North

(*Continued on page 31*)

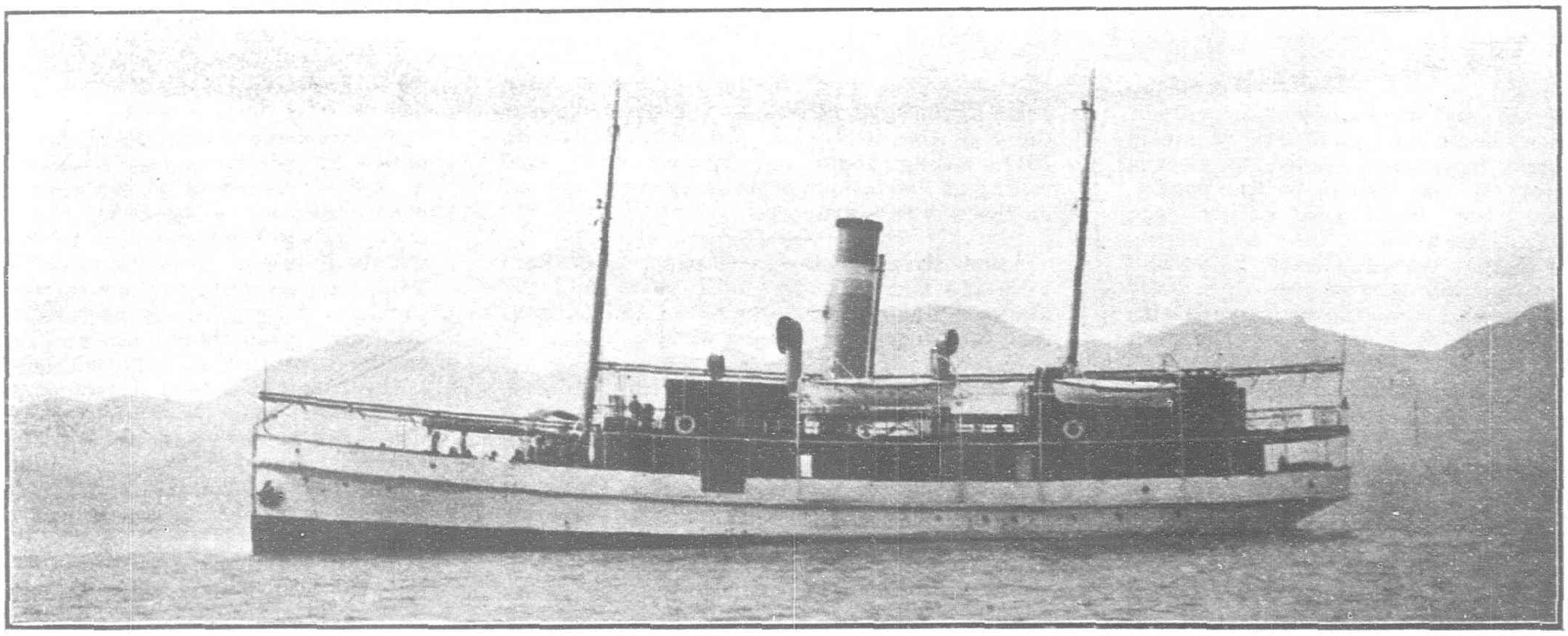
NEW STEAMERS BUILT BY THE TAIKOO DOCKYARD & ENGINEERING CO. OF HONGKONG, LTD.



STEEL SCREW STEAMER, "TENCHO MARU" BUILT FOR THE SOUTH MANCHURIA RAILWAY CO.
Length overall, 255 ft.; Beam 36 ft.; Depth 16′ 6″; Gross Tonnage 1,276 Tons; Speed, 11 knots.



STEEL TWIN SCREW TUG "TAIKOO" BUILT BY THE TAIKOO DOCKYARD & ENGINEERING CO. OF HONGKONG FOR THEIR OWN USE.
Length overall, 150′ 0″; Breadth, 26′ 6″; Depth Moulded, 13′ 6″; Gross Tonnage, 353 Tons; Speed, 13 knots.



STEEL TWIN SCREW STEAMER "MILEY" BUILT FOR THE U. S. ARMY QUARTERMASTER'S DEPARTMENT, MANILA, P.I.
Length overall, 140 ft.; Beam, 26 ft.; Depth, 13′ 6″; Gross Tonnage, 360 Tons; Speed over 12 knots.

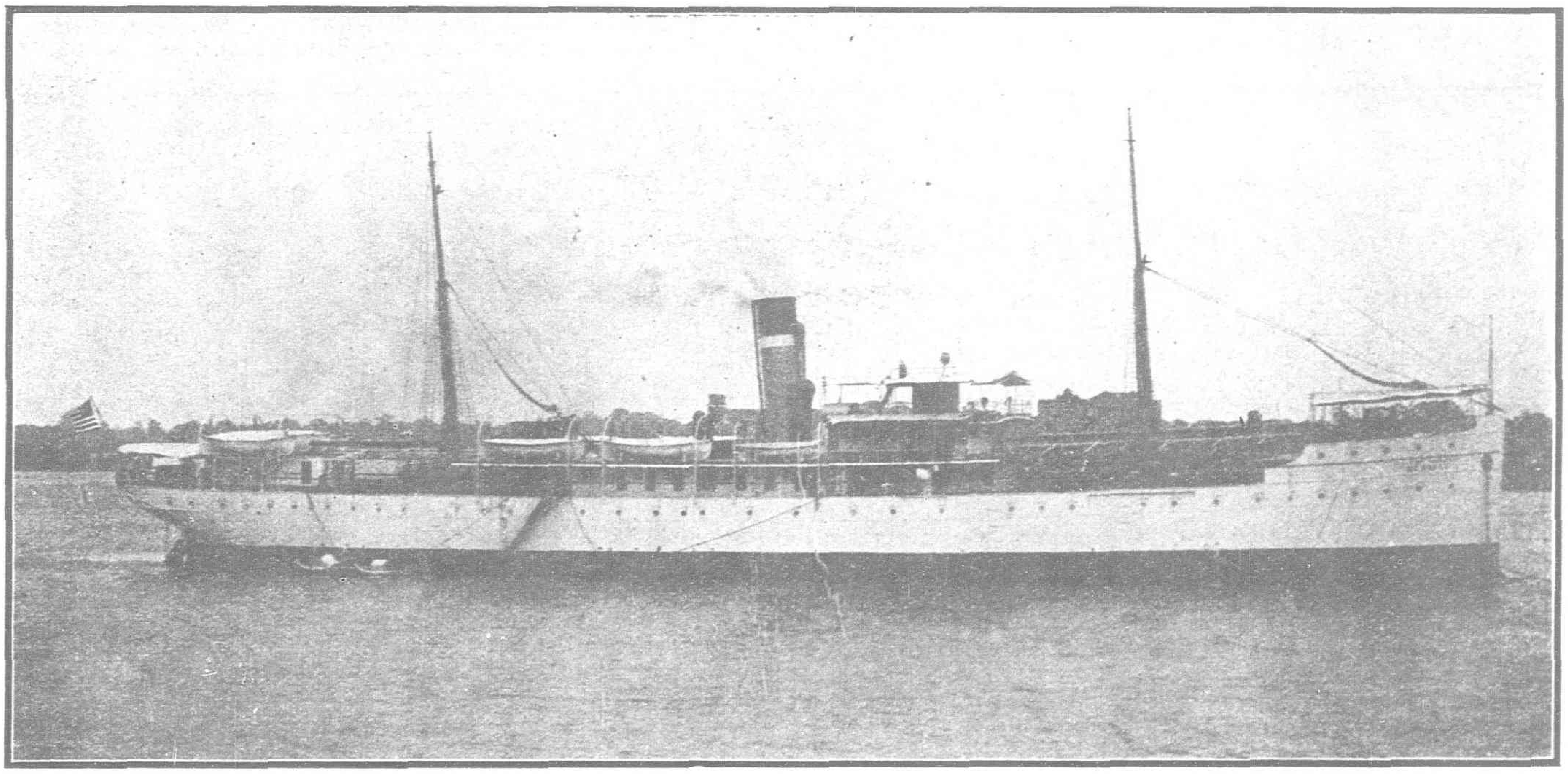
SHIPBUILDING NEWS

U. S. ARMY TRANSPORT MERRITT

Built by the Shanghai Dock and Engineering Co. Ltd. Shanghai.—On May 10, the trial trips of the new transport Merritt, were held over a measured mile course in the lower Yangstze, three runs with the tide, and three against.

The conditions stipulated the vessel to have about 900 tons dead weight on board and a full complement. This was supplied by bars of pig iron. The mean speed developed over the measured mile was $13\frac{3}{16}$ knots per hour, which was most satisfactory. After this the vessel was tried in turning and she answered her helm splendidly and make two complete circles, turning each time in her own length. The ship's greatest success was in a four hours' continuous run when the total distance registered 53 knots. A mean speed of $13\frac{1}{4}$ knots was maintained, this being $\frac{3}{4}$ of a knot over the contract speed of $12\frac{1}{2}$ knots. These results were entirely to the satisfaction of the builders' and the government representatives.

A full description of the vessel was published in the February issue of this paper, at the time of the launching.



UNITED STATES ARMY TRANSPORT "MERRITT," BUILT BY THE SHANGHAI DOCK & ENGINEERING CO., LTD.

On the main deck is situated the saloon fitted in white and gold and leather settees, the apartment being lit by clusters of nickel plated electric lights and cooled by electric fan. Opening off the saloon is the pantry. Then come the first class cabins each containing two berths with hair and spring mattresses, leather settees, electric lights and fans, and toilet appliances of the U. S. Navy pattern. At the end come the bath rooms with hot and cold water, showers, etc. At the stern is the sick bay and hospital with Doctor's office, operating room, baths, berths, etc. On the same deck is situated the Quartermaster's office and sleeping apartment. Forward are the crew's quarters. On the bridge deck the Captain and Officers have their quarters. On top of the chart room there is a powerful search light. On the boat deck there are ten boats and two life rafts. In the orloop deck there is a special cold storage and refrigeration plant having a capacity of 200 tons of frozen meat, etc. On the troop deck there is accommodation for 350 soldiers and non-commissioned officers. Amidship there is the commissary store. On both sides of the passage ways on this deck are the officers' and engineers' mess room, Q.M. Sergt. and Q.M.'s clerks quarters, galley, baths and showers for the troops, etc. A special feature of the troop deck is the ventilation by sirocco blowers electrically driven by means of which a constant supply of fresh air is supplied through metal shafts which draw the pure air from accumulating chambers. The vessel is twin screw, her contract speed being $12\frac{1}{2}$ knots. She is also fitted with powerful winches and booms for the hoisting of guns and ammunition, etc.

Japan.—Yokohama merchants are asking for the establishing of better steamship connections between Japan and South America. It is proposed to increase the subsidized service of the Toyo Kisen Kaisha to the west coast of South America and to extend the service to Brazil on the east coast. The merchants report increasing Japanese trade with these South American countries.

Siam.—The Straits Steamship Co. (Ltd.) has started competition with the Siam Steam Navigation Co. (Ltd.) for the trade on the west coast of the Gulf of Siam. The first steamer, the *Poh Ann*, arrived in Bangkok October 16, 1911, sailing again on November 11, and calling at the various ports along the west coast on the way to Singapore.

Amur River Vessels.—During 1910 there were 218 steamers, 23 motor boats, and 292 barges plying on the Amur River and tributaries, the deepest draft being $4\frac{1}{2}$ feet.

Arctic Navigation Possible.—Capt. Webster, of the British yacht *Nimrod*, who made a successful attempt during 1911 to reach the mouth of the Yenisei River via the Kara Sea, has presented to the Russo-English Chamber of Commerce at St. Petersburg valuable information, which proves that regular steamship communication can be maintained between western Europe and the ports on the Arctic coast of Siberia.

Japan, Shipping Items.—A Japanese steamship company is being organized to further commercial exploitation in the South Sea Islands.

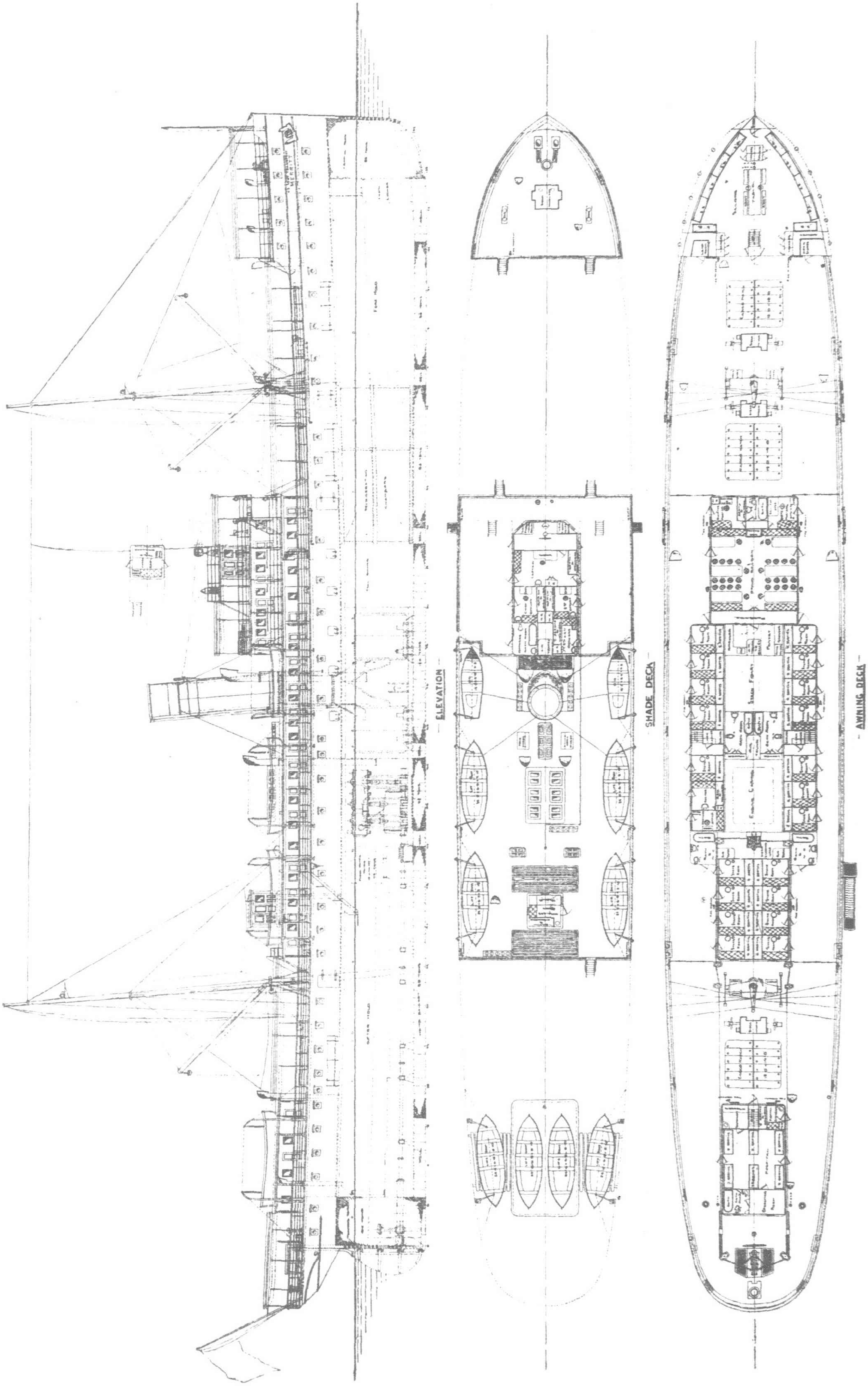
A number of cargo boats are being chartered in the trans-Pacific service to carry American cotton to Japan.

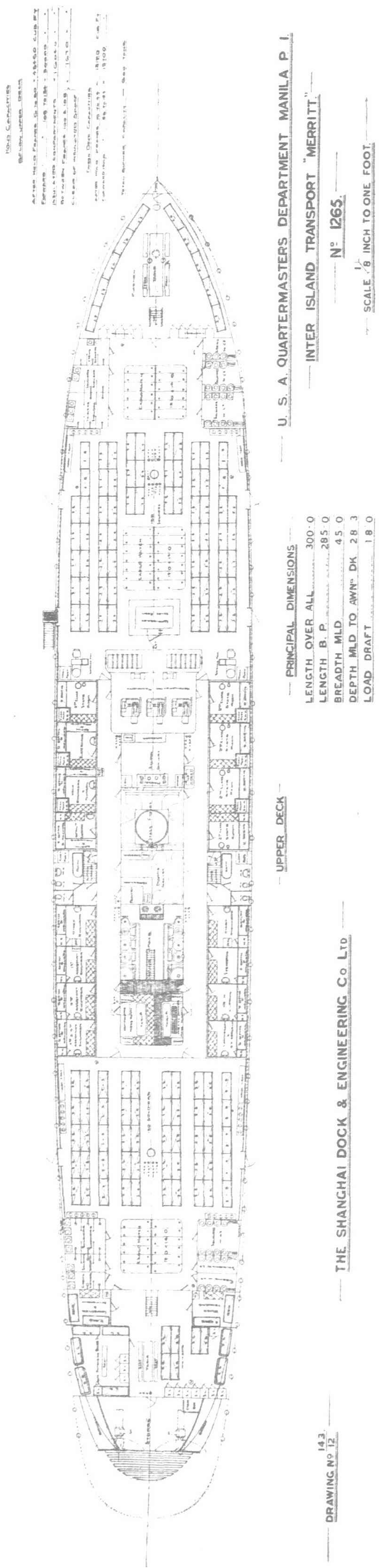
French Mail.—It is announced in Eastern ports that as a result of extending the mail subsidy contract with the company by the French Government for 25 years the Messageries Maritimes service to China and Japan is to be increased. There will be a complete semi-monthly service of ships of the *Paul Lecat* type (the *Paul Lecat* being the 16,820-ton vessel now under construction for this service). The vessels will have a speed of 18 knots and accommodations for 500 passengers.

Conference Rebates.—A circular sent to firms dealing with the Shipping Conference announces that a rebate of 5 per cent on the freight paid will be granted to those exporters from Singapore, Penang, and the Malay Peninsula to Europe, or to ports via Europe, who from January 1 to June 30, 1912, confine their shipments to the Nippon Yusen Kaisha The circular reads in part:

To those so confining their shipments for the entire 12 months ending December 31, 1912, a further rebate of 5 per cent on freights contributed up to June 30, 1912, and 5 per cent on those from that date to December 31, will be granted. To those who, on June 30, 1912, have so confined their shipments for the previous 18 months, an additional 5 per cent on freight contributed during the 6 months ending December 31, 1912, will be allowed.

Until further notice, shipments made by the Peninsular and Oriental, Ocean Steamship Co. (Ltd), Messageries Maritimes, North German Lloyd, Austrian Lloyd, Società Nazionale di Servizi Marittimi, Compaña Transatlántica of Barcelona and Cadiz, Glen Line (McGregor, Gow, & Co., Ltd.), Ben, Mutual, Hamburg-American Lines, and by the German Australian, Rotterdam Lloyd, Stoomvaart Maatschappij Nederland, East Asiatic Co. of Copenhagen, Russian East Asiatic Steamship Co. of St. Petersburg, Russian Steam Navigation & Trading Co.,


ELEVATION
SHADE DECK
AWNING DECK


HOLD CAPACITIES
BELOW UPPER DECK
U. S. A. QUARTERMASTERS DEPARTMENT MANILA P. I.
INTER ISLAND TRANSPORT "MERRITT."
No 1265.
SCALE 1/8 INCH TO ONE FOOT.
PRINCIPAL DIMENSIONS
LENGTH OVER ALL 300·0
LENGTH B. P. 285·0
BREADTH MLD 45·0
DEPTH MLD TO AWNG DK 28·3
LOAD DRAFT 18·0
UPPER DECK
THE SHANGHAI DOCK & ENGINEERING Co LTD
DRAWING No 143/12

Compagnie Française de Navigation de Chargeurs Réunis steamers to their Continental ports of call, or ports adjacent thereto, and by any conveyances to Baltic and Black Sea ports, will not invalidate claims for the above.

No "returns" will be payable on freight contributed by rice, hemp, tobacco, or treasure. Exporters applying for the returns, which will be payable in London, must fill up and sign forms obtained from the agents.

JAPANESE USE OF PANAMA CANAL.—Mr. M. Shiraishi, a member of the board of directors of the Toyo Kisen Kaisha (Oriental Steamship Co.), is at present making a personal investigation of the Panama Canal route.

When the Panama Canal is opened, it is probable that one or more of the three large Japanese steamship companies (Nippon Yusen Kaisha, Toyo Kisen Kaisha, and Osaka Shosen Kaisha) will either extend their present America-Japan-Hongkong service or establish new lines to the Atlantic seaboard. No report or plan on the project has yet been made public, and inquiry at the offices of the abovenamed companies elicited the uniform reply that while they must do something to avail themselves of the use of the canal when it is completed, they are still investigating, and no definite plan has been or is being made.

ROUND-THE-WORLD LINE—NEW BOATS.—Officers of the Nippon Yusen Kaisha and of Osaka Shosen Kaisha have personally inspected the Canal Zone. Rumor had it that the former will establish a new round-the-world line, starting from Yokohama for New York, via Panama, thence to Yokohama by way of Europe and Suez. This is not confirmed by the officials. At present the company has 11 steamers, all over 6,000 tons gross (besides 1 chartered and 3 owned by the company, used as extra-cargo fleet) on the European line, and 6 steamers on the American line. In 1911 the company placed orders with shipbuilding yards in Japan for 2 steamers, both of 6,200 tons, for the American line, and 2 of 10,500 tons for the European line.

These new vessels will be built to meet all the requirements of the Japanese shipbuilding subsidy act and the navigation subsidy act. Even should the Japanese Government fail to make subsidy provision for whatever new line on which the company may place these vessels, they would draw subsidy under the navigation subsidy act. The company now owns 70 steamers, with an aggregate tonnage of 280,000 tons, and 7 chartered (Government and Red Cross Society) steamers aggregating 26,000 tons.

POSSIBLE EXTENSION OF SERVICE TO NEW ORLEANS.—Another rumor was to the effect that the Osaka Shosen Kaisha, now having a trans-Pacific fleet of six 6,000-ton steamers, being cargo boats with little or no first-class passenger accommodations, contemplates the extension of its Hongkong-Japan-Tacoma line to New Orleans. This company purchased the *America Maru* (6,300 tons) from the Toyo Kaisen Kaisha, and it will probably build two or more steamers of a larger type.

FORMOSA.—Yo Sam Pa, one of the wealthy Chinese residents of Daitotei, has succeeded in organizing a small steamship company with $500,000 capital. He now owns the *Chozan Maru* and will add three large ships. The service will be bi-monthly from Tamsui to Foochow, Hongkong, Singapore, and Batavia.

THE RUSSIAN VOLUNTEER FLEET.—Has purchased 5 new steamers, and with this season start an improved steamship service between Vladivostok, Kamchatka, and Anadir. While navigation is open 9 steamers will be put on and 18 round trips will be made from Vladivostok.

NEW ICE BREAKERS FOR VLADIVOSTOK.—Consul John F. Jewell reports that in order to cope with the increasing commerce and importance of the port of Vladivostok it is stated that two new ice breakers have recenty been ordered by the Government, and that some will be built at the Russian works in the Baltic.

THE YOKOHAMA-MARU.—A new steel vessel for the Nippon Yusen Kaisha, was successfully launched at Nagasaki on January 30. It is a new type of freight carrier for this line and if to be placed on the Seattle-Hongkong run. It will also accommodate a limited number of passengers.

The vessel has twin screws, a shelter deck, and dimensions as follows: Length, over all, 415.6 feet; length between prependiculars, 400 feet; depth, 30 feet; gross tonnage is 6,200 tons. The engines are triple expansion, reciprocating, capable of developing 15 knots per hour. The vessel has been built to Government requirements, under supervision of Lloyds' surveyors, and will be classed as 100 A1 at Lloyds. It will receive subsidy from the Japanese Government under the following law:

Navigation subsidy shall be granted at the rate of not more than 50 sen (25 cents) per gross ton per 1,000 knots sailed for a ship with a maximum speed of 12 knots per hour, such rate to be increased by not more than 10 per cent for each additional knot per hour, according to the conditions of the route. Provided, that for every year over 5 years old a vessel is, a successive discount of 5 per cent shall be made. For calculating the subsidy the shortest distance between ports shall be taken, and less than 1 ton and less than 1 knot shall not be reckoned.

AMUR TRANSPORTATION.—The administration of the Amur Railway has decided to purchase and rent a number of river steamers belonging to the Chinese Eastern Railway for transporting railway freight. It is believed that upon the completion of the Amur Railway all the steamers of the Chinese Eastern Railway will be transferred to the former, and the latter will close its navigation department, retaining only sufficient steamers for military purposes.

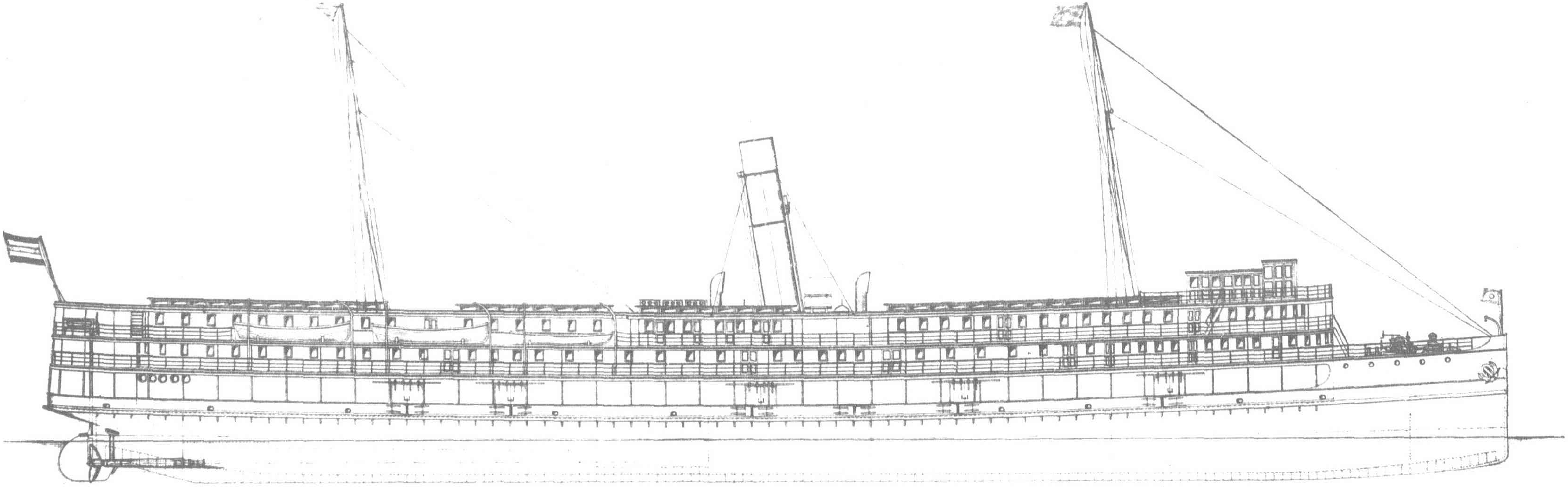
HARIMA DOCKYARD AND IRON WORKS.—The new dockyard and iron works opened on January 21 (making the fourth private dockyard in the Kobe district, besides the Government yards at Kure) is at Oh, near the head of Oh Bay, on the Inland Sea, 47 miles west of Kobe by rail. It is owned by the Harima Dockyard and Iron Works Co., which intends to construct another dry dock to accommodate vessels of 2,000 tons in the near future. The following description is from a press account of the opening ceremony:

The dock, which is 434 feet long and 84 feet wide, has been cut out of solid rock. The entrance is closed by a floating caisson, made by the Osaka Iron Works. Two centrifugal pumps, discharging 5,000 tons of water an hour, can empty the dock in about three hours, while by opening four valves in the caisson the dock is filled in about an hour. The centrifugal pumps were made by a firm in Bedford, England, and are sunk underground in a large brick chamber level with the floor of the dock. The water is discharged into a short, granite-lined conduit that leads from the top of the pump room into the sea.

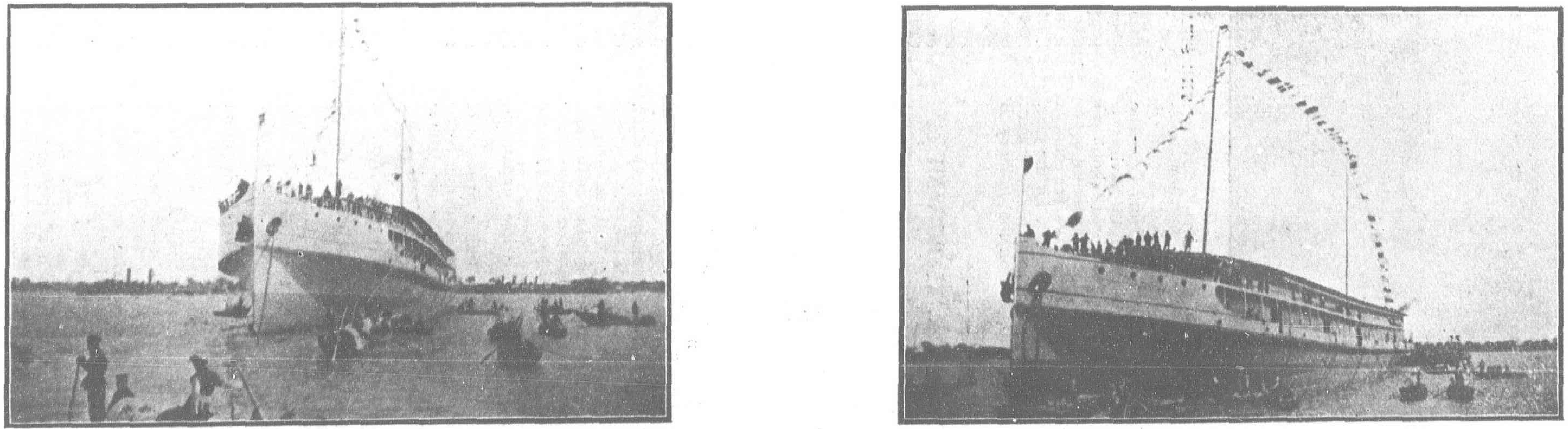
Along the dock are several hand capstans for use in warping ships; these capstans are to be later on controlled by electric power. The dock will accommodate vessels up to 6,000 tons, and near by are machine shops with lathes, drills, and cutting and planing machines. There is also a casting shop adjoining the fitters' department, but this is not quite completed.

THE NANYO KISEN KAISHA.—Was recently promoted by the Mikami Steamship Company in Kobe with the purpose of establishing a shipping service from Japan to Manila, Saigon, Singapore and Java, the Japanese government assisting, and the prospects of the undertaking are hopeful.

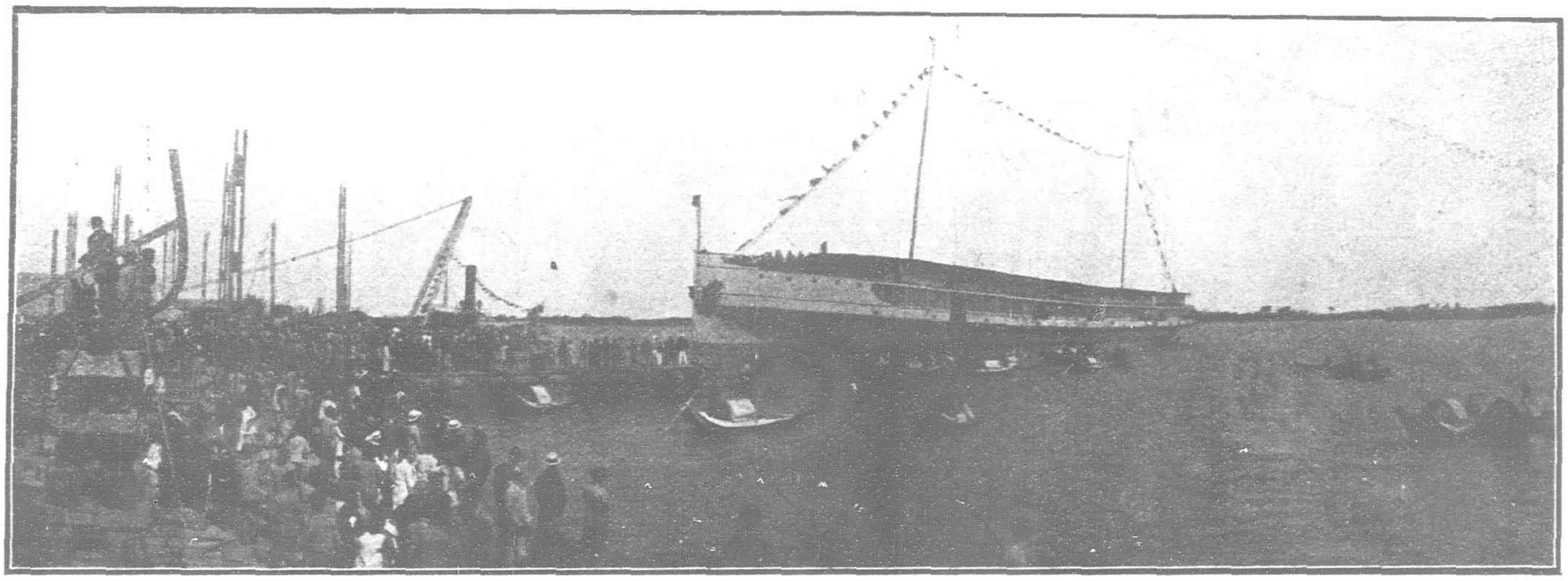
The plan of the new company is to start operating in October, of the present year, with two, 3,000-ton steamers.



RIVER STEAMER "KIANG-WAH," BUILT BY THE KIANGNAN DOCK & ENGINEERING WORKS FOR THE CHINA MERCHANT'S STEAM NAVIGATION COMPANY



THE "KIANG-WAH" AFTER THE LAUNCH



THE STEAMER ‘‘KIANG-WAH’’ AFTER THE LAUNCHING

China Mutual Steam Navigation Co.—The directors of the China Mutual Steam Navigation Company recommend a final dividend of 3 per cent. on the ordinary shares, making 6 per cent., together with a bonus of 24 per cent., a total distribution of 30 per cent. for the year. A dividend of 3 per cent., making 6 per cent. for the year, is proposed on the ordinary B shares.

THE C. M. S. KIANG-WAH

Built by the Kiangnan Dock and Engineering Works, Shanghai.—On may 2nd, the S.S. Kiang Wah, was launched from the yards of the Kiangnan Dock and Engineering Works at Shanghai. The steamer was designed and built for the Yangtze River service of the China Merchants' Steam Navigation Company. To the specifications of Capt. W. H. Lunt, the Marine Superintendent and Mr. G. Wallace, Engineer Superintendent of the Company. She has the distinction of being the largest vessel constructed in China.

With a tonnage of about 4,000 the Kiang-Wah has the following dimensions:—length over all, 340 ft.; length between perpendiculars, 330 ft.; breadth moulded, 47 ft.; breadth extreme over guards, 58 ft.; depth moulded to main deck, 1 4ft. 9 in.; moulded to main deck, 14 ft. 9 in.; 6 in.; height of upper to passenger deck, 7 ft. 6 in.; height of passenger to shade deck, 7 ft. 6 in.

There are two sets of triple expansion, surface condensing inverted direct acting engines, designed for a working pressure of 190 lb. per square inch. The condenser is one of Weir's ‘‘Uniflux’’ type. The air pumps are of Weir's ‘‘Dual’’ type and all other auxiliary engines, feed pumps, and feed heaters have been supplied by the firm of Messrs. G. and J. Weir.

The boilers are of Babcock & Wilcox marine water tube type, four in number, constructed under Lloyd's survey, for a working pressure of 190 lb. per square inch and designed with ample grate area for steaming with inferior coal.

The accommodation for first class European passengers is located forward below the uppermost deck in large and airy staterooms with a spacious and luxuriously fitted saloon adjoining. There are eight staterooms in all for the European passengers, each having two brass frame beds with wire woven spring mattresses, an upholstered settee, a patent folding lavatory and a wardrobe. The saloon is panelled in English oak. The dining accommodation of the saloon is arranged on the Continental style with small round tables and leather covered chairs. Electric fans are installed in the saloon and in all the European and Chinese storerooms as well as in the officers' and Engineers' rooms.

For the first class Chinese passengers, accommodation is provided on the deck below that set apart for the European saloon, and here there are staterooms for twenty-eight persons, all the rooms being arranged to open into a saloon, which is very spacious and furnished in Chinese style.

Second class passengers are berthed in a large deckhouse on the saloon deck aft with cabins, several of which are arranged to accommodate families; and a saloon extending the whole length of the house. There is also space for the second class passengers on the deck below, situated abaft of the first class Chinese accommodation, as well as the midship of the same deck where there are berths for 170 persons.

The third class accommodation is provided with beds for about 200 passengers, but there is a space for accommodating considerably more.

The wheelhouse, captain's and pilot's cabins are on the shade deck. The wheelhouse is for the type commonly seen on the American river steamers and is fitted, with all necessary appliances for navigating purposes including a controlling gear for steam steering engine.

Fittings and Machinery.—The vessel is fitted with six life-boats of large capacity and a number of rafts with a total carrying capacity of over 250 persons, and is also equipped with numerous life-buoys as well as a life-belt for every passenger, with over 500 to spare.

She is lighted throughout by electricity, for which there are two generating sets, the smaller for the fans, and the larger for the lights as well as the fans. The first class European and Chinese saloons and staterooms and also the captain's, officers' and engineers' rooms are all heated by steam radiators.

The French Mail.—The French Parliament has renewed the contract with the Messageries Maritimes for postal services in the Mediterranean, Indian Ocean, Austrlia and the Far East, but several important alterations are made, notably in respect of speed, the tonnage of the ships, and the number of voyages, increase and augmentation being provided for in each case. The steamers on the Marseilles-Saigon-Yokohama run will have to do 15 knots instead of 14, and while the fortnightly service is maintained, a new monthly service, Marseilles-Saigon-Haiphong, to average 13½ knots, is to be created, to alternate with the service of the Chargeurs Réunis, thus giving Indo-China a weekly service with the metropolis. The second of the new mail steamers now in course of construction for the Far East service of the Messageries Maritimes Co. will be named the Andre Lebon, the name of the president of the Company. The Andre Lebon will enter the line in 1943 and will be a sister ship to the s.s. Paul Lecat, being of 16,820 tons, with a length of 555 feet; horse-power 11,000, passenger accommodation 750. The s.s. Paul Lecat will leave Marseilles for her first China trip on September 22.

Three new steamers have been added to the Lancashire Shipping Co.'s fleet plying between New York and Hongkong by way of Manila. The vessels have freight capacity of 8,00 and 10,000 tons, limited passenger accommodations, and a speed of 12½ knots.

A Strong Steam Tugboat.—Of the icebreaker salvage type, fitted with fire pumps, is provided for the Vladivostok commercial port by an appropriation of $30,000 from the St. Petersburg Government.

South Philippines S. S. Co.—Articles of incorporation have been granted to the South Philippines Steamship Company, a newly organized passenger and freight transportation concern launched in Zamboanga, Mindanoo, to engage in the coast-wise trade. The company has a capitalization of £500,000, of which £150,000 has been subscribed and paid up. Subscription of the capital stock to date is divided as follows:—H. C. Pfort £100,000, P. J. Moore, £25,000, J. H. Fincke, £25,000, J. A. Hackett; £1,000, and R. M. Denison, At a meeting of the stock-holders of the company, held recently, by-laws were adopted delegating the management of the corporation to a board of directors of five members to serve for terms of one year. The officers elected were Mr. Pfort, president, Mr. Moore, vice-president secretary, and Mr. Fincke, treasurer.

Hamburg-Amerika Line.—The report of the Hamburg-Amerika Line for 1911 shows that the net profit was m.43,799,044. Deducting interest on the prior loans, there remains m.40,520,185. Of this sum m.1,348,108 has been assigned, in accordance with the statute of the company, to the insurance reserve fund, and a sum of m.27,676.412 has been employed in writing down the value of ships, etc., and adding to renewal funds and other accounts, making together m.29.024 520. The available balance is m.11,495,665, which admits of a dividend of 9 per cent., leaving a sum of m.245,665 over. Most departments of the company's freight business showed a highly satisfactory development, but the emigration to the United States suffered an appreciable reduction, as compared with 1910. Regarding the Far East the report says that the plague in the north of China had interfered with the export of soya beans, but in general the consequences of the plague were not so severe as was expected. The revolution had brought complete uncertainty into all commercial circles.

New Vessels for the P. & O.—Of the four intermediate steamers of the *Nile* class now building at Greenock for the Peninsular and Oriental Steam Navigation Company the two latest to be laid down will be called *Nagoya* and *Nellore* respectively; the two earlier ships, which are approaching completion, are, as stated in the company's last report, to be named *Nankin* and *Novara*. These additional vessels will bring the *Nile* class to a total of eight ships, each of 7,000 tons, and will be chiefly employed in the company's direct intermediate services between London, Calcutta, the Straits Settlements, China, and Japan, by which pessengers are conveyed without transhipment and at lower fares than those ordinary ruling.

The Osaka Shosen Kaisha will shortly open the regular steamship service between Takao, (Formosa), and Tientsin, with the steamers Bujun Maru and Choshun Maru of gross tonnage 1850; speed 12 miles an hour respectively. The Co. will maintain the regular service of twice a month, calling at Keelung, Foochow and Shanghai both ways and Dairen on the homeward trip.

1,000 Foot Dock for Pearl Harbor—The bureau of yards and docks of the W.S. Navy department has prepared plans for the increase in the length of the drydock which is under construction at the naval station at Pearl Harbor. The design of the dock as originally adopted called for a length of 800 feet, and it is proposed to add 200 feet. A dock of 1,000 feet at Pearl Harbor will require an additional expenditure of $650,000. This 1,000-foot dock in the Pacific is in accordance with the recommendation of the secretary of the navy contained in his annual report for two such docks—for the vessels in the Pacific and the other somewhere on the Atlantic coast.

New Motor Boat Co:—The Singapore Marine Motor Service has been formed to establish a service of modern motor launches for the use of the general public, passengers and the nautical community within the harbour limits of Singapore and the neighbouring islands. Estimates have been prepared showing a nett profit of $1,810 per month or 28 per cent per annum on the total capital. The capital is $75,000, of which $60,000 has now been subscribed. The shares are $10 each, payable $3 on application and $3 on allotment, and the balance as required. Six motor launches will soon be running in the harbour to various points and amongst the shipping.

The launches are 36½ by 8½ by 3½ moulded depth, and draw loaded main draft, 18 inches. They are fitted with the Kelvin motors which develop 14-16 h.p. and the boats attain a speed of 6½ knots. The two large ones have 30-40 h.p. engines.

The Philippine Coast Guard Cutter Balabac has been sold to British North Borneo, the price agreed upon being P.80,000.

The Balabac is of the same size and general type as the Polillio and other better known craft of that class It has a gross tonnage of 460 and is well engined and equipped.

New Tank Steamers.—Will be built by the Standard Oil Company in Germany for placing in service between European and American ports and in the Oriental trade, according to advices received at San Francisco. One of them will be the largest carrier of the kind in the world, capable of handling 15,000 tons of the fluid. She will be operated by the Dentsche-Americanische Petroleum Gesellchaft, the German branch of the great oil trust, which now owns a fleet of twenty three steamers of upward of 84,000 gross tons. The vessel, according to, will have a length of 525ft., a breadth of 66¾ft., a depth of 41ft. and will have a loading capacity of about 15,000 tons. She will be driven by two 6-cylinder, 1,700-h.p. Krupp-Diesel engines which will give her an ocean speed of about 10 miles an hour. Two-thirds of the length of the vessel will be occupied by the tanks, which will be divided by transverse bulkheads into 11 compartments, which, in their turn, are separated into 22 tanks, partitions being made by a longitudinal bulkhead extending over the whole length.

The Standard Oil Co. has now under construction on the East Coast two modern tankers, which will be sent to the Pacific as soon as completed. One, building at the New York Shipbuilding Co.'s yards is 380 ft. long and has a capacity of 30,000 barrels. The tanker which will be turned out by the Fore River yards is 435 ft. long and will have a capacity of 60,000 barrels.

Messrs. Pujalte and Company have purchased a new launch at Hongkong for the Philippine inter-island service. The new launch is 90 feet long, 15 feet wide and 8 feet deep, and was but recently completed at Hongkong. Some alterations are being made and cabins are being built for the crew. It is expected that these will be completed in time for the steamer to reach Manila about April 6th.

The launch is to be named the Sabatan.

Pacific Mail Freighters:—Washington, March 11, 1912.—"We are ready to build four monster freighters costing four million dollars each for the New York Manila service upon completion of the Panama canal, if the government will let us," said said Vice-president Schwarin of the Pacific Mail steamship company. The government, however, seems to be bent upon putting obstacles in our way."

There is a reported movement in Boston to form a new steamship line from that port to the East Indies and the Philippines.

Kiangnan Dockyard:—At the time of the outbreak of hostilities four war vessels ordered by the Manchu Government were under construction, two cruisers 275 ft. long and a couple of gun-boats being on the stocks. With the downfall of the Government, work on these vessels was stopped.

Other vessels under construction include a new river boat for the China Merchants, which will be the largest vessel of their fleet, its dimension being length 330 ft., breadth 47 ft., and depth 14 ft. 9 in. The vessel is rapidly nearing completion.

Work is also proceeding on a number of smaller craft, amongst them being five light ships ordered by the Customs for the Yangtze, launches for various firms, and cargo lighters. Two of the launches are ready for transport to Russia, where they will work on the Amur river.

The Mitsu Bishi Dockyard and Engine Works, Nagasaki, have purchased the sole patent rights, for Japan, of the air pumps manufactured by Messrs. J. Weir and Co., of Glasgow. Workmen have been sent to Glasgow from the Dockyard to learn the method of manufacture.

The *Shidzuoka Maru* was launched at the Kawasaki Dockyard, Kobe, on the 2nd inst. She is a steamer of 6,200 tons, building for the Nippon Yusen Kaisha, and is a sister-ship to the *Yokohama Maru* which is being completed for sea at Nagasaki.

Motor Boats for Chinese Waterways.—Two motor boats arrived in Swatow at the end of January for measurement and certification under inland water regulations by the Chinese customs authorities, being certified to carry 90 passengers each. These boats will ply as passenger launches between the cities of Chaoyang and Kueisu. A part of the 30-mile journey is through the Bay of Haimun, just south of this port, but the most of it is up a small river on the banks of which stands Kueisu. Chaoyang is already connected with this port by a steam-launch service.

These launches have a length of 63 feet, beam 14 feet, draft 18 inches, depth of hull about 4 feet. The hull is completely covered by a superstructure about 4 feet high, with the exception of a short deck forward, where there is a hand winch for handing the anchor. Being designed solely for passenger traffic, there are no cargo hatches. The long cabin formed by the superstructure and the hull is divided by transverse bulkheads into four main compartments, one for the engines and the other three for passengers, who enter the saloons by side doors, communication from one compartment to another being by a grating gangway carried alongside the vessel.

The Propelling Equipment.—The engine compartment amidships has no outside entrance, being entered from the after saloon through the chief engineer's cabin, which occupies some 10 by 3 feet on the port side of the engine room. On the starboard side is a similar cabin, but opening outside and not into the engine room. Thus the engines are effectively protected from rough weather.

The hull is of teak wood throughout. It is cut square at the stern and is cut away down the middle aft of the engine room to form a tunnel, in which the propeller works. A pair of rudders are fitted one on each side of the propeller tunnel. This form of hull is, I believe, in common use in the United States where launches are run in very shallow water.

The engines are Bolinder's (Stockholm, Sweden) patent 2-cylinder 50-horsepower direct reversible type, burning crude oil. They are capable of giving these craft a speed of something over 9 knots per hour. The exhaust is through a funnel, which also helps ventilate the engineroom. A compressed air whistle is provided.

These craft were built and the engines installed by Ulderup & Schluter, in Hongkong, at a cost of about $6,000 gold each, including $3,150 for engine.

The engines are said to consume 15 to 17 cents (gold) worth of oil per hour when when running at full speed, or, say, $1.58 per working day. For crew the monthly wages bill is about $56 each, the crew consisting of one chief engineer, at $13.50; one second engineer, at $11.25; and a crew of seven or eight deckhands, ticket collectors, etc., at $3.60 to $4.50 each.

Fitting and Decks.—The bridge is at the forward end of the superstructure, the entrance to it being through the forward saloon. To avoid undue height above the water line, it is not decked over. The forward deck, about 5 feet in length, is carried to a square end, to facilitate landing on the banks at way stations.

These boats, drawing only 18 inches, are adapted for very shallow waters. Their maximum height of abont 5½ feet above the water line enables them to clear easily the numerous bridges on the smaller rivers and canals in China.

Chinese being unaccustomed to the luxuries of travel demanded in the Occident, fittings are conspicuous by their absence. Each saloon has benches built along the sides and ends, and a table in the middle. Two toilets are located right aft.

Great Advantages of this Type.—As compared with steam launches, it would be possible to purchase for the price paid for these boats only a very small launch, with no greater passenger capacity, drawing at least 3 feet, and considerably more expensive to operate. The steam launches running to Chaoyang cost approximately the same as these motor boats and carry about the same number of passengers, but burn at least 1 ton of coal a day—fuel, $5.40—and carry a much larger and proportionately expensive crew.

Despite the fact that these boats were built for use in shallow waters, they came up from Hongkong under their own power, 185 miles of open sea, in very rough weather.

These are the first motor launches to be used commercially in this vicinity, and if successful, as there seems good reason to believe they should be, should prove the forerunners of many more. It is expected that motor launches for use on the Han River above Chaochowfu, will arrive from Hongkong shortly. (C. R.)

New Tugs Hankow.—The trial trip of the steel twin-screw steam tug Ping Fung, built by the Yangtze Engineering Works, Ltd., Hankow, and designed by Mr. Wong Kwong, M.I.N.A., M.I. Mech. E., etc., general Manager of the Works, for the Han-Yeh-Ping Iron and

NEW CHINESE CRUISER "FEI-HUNG"

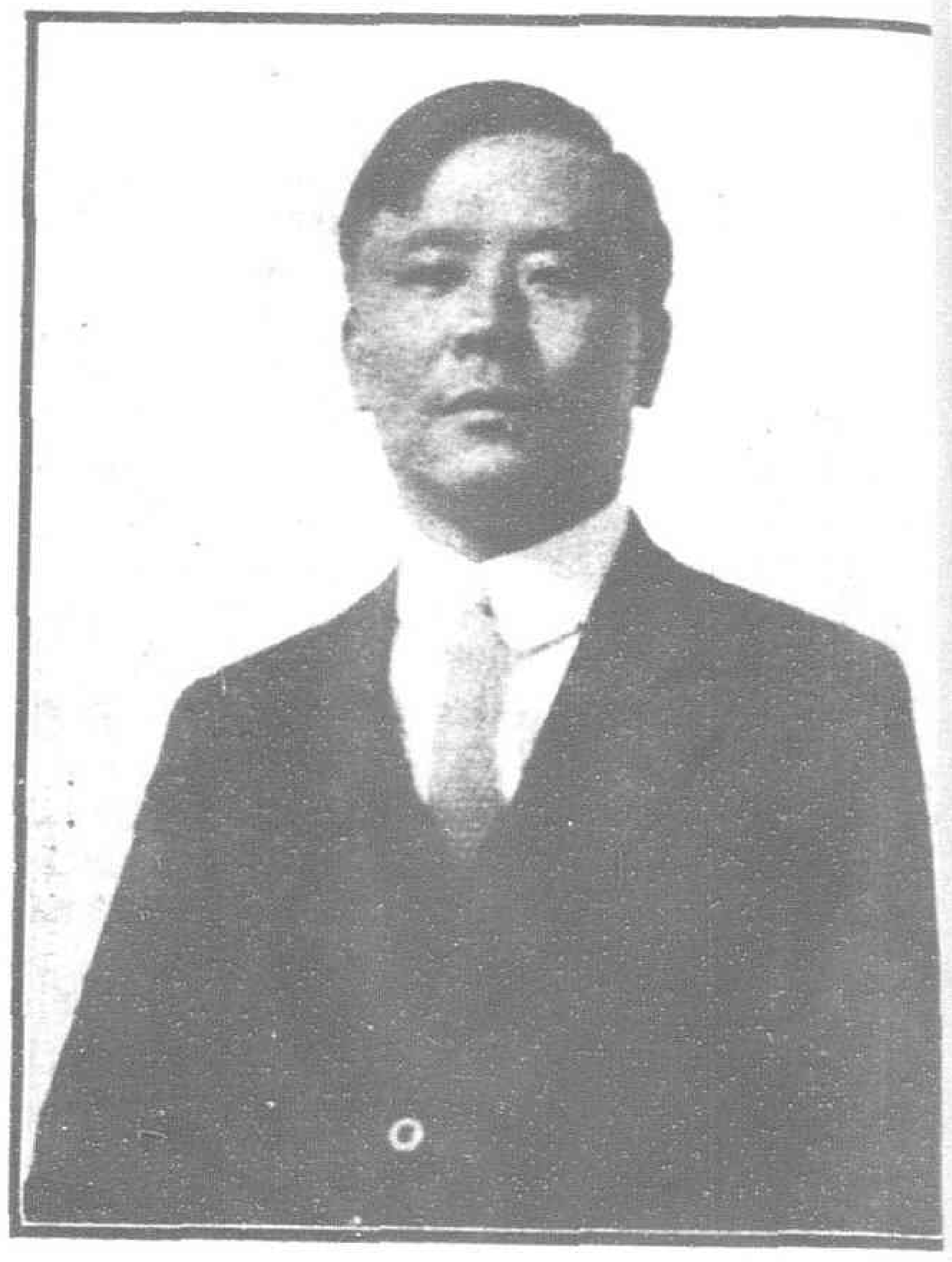
BUILT BY THE NEW YORK SHIPBUILDING COMPANY, CAMDEN, N.J., U.S.A.

CAPTAIN YANG

Chinese Naval Commissioner, detailed to inspect the construction of the "Fei-Hung"

LAUNCH OF THE "FEI-HUNG"

Miss Chang, the Daughter of the Chinese Minister, Christening the New Cruiser



COMMANDER WANG

Chinese Naval Commissioner, inspecting the construction of the "Fei-Hung

The Chinese cruiser Fei Hung, which is designed as a training ship for officers and men of the Chinese Navy, was launched at the yards of the New York Shipbuilding Company, at Camden, N. J. on May 4th.

The Chinese Minister, Chang Yin Tang, accompanied by Yung Kwai, First Secretary of the Legation, was present, together with a party of Washington officials and a delegation of Chinese students from the University of Pennsylvania.

Miss Chang Tuyi, the youngest daughter of Minister Chang, christened the Fei Hung.

The interests of the Chinese Government in the construction of the cruiser were looked after by Capt. C. C. Chen, Capt. O. S. Yang and Commander L. Y. Wong, who were stationed at the shipyards.

A protected cruiser, the Fei Hung is 320 feet between perpendiculars, 39 feet moulded breadth, 22 feet 6 inches moulded depth, 16 feet mean draft, displacement about 2,600 tons, with a speed of about 20 knots. Through the machinery space extends a double bottom, while the hull is divided into numerous compartments by watertight bulkheads and flats. Within the double bottom stowage is provided for feed water for the boilers.

Her Armament.—Her armament consists of two six-inch rapid fire guns located respectively on the forecastle and the poop decks; four four-inch rapid fire guns on the upper deck at sides, two just abaft the forecastle and two just forward of the poop; two three-inch rapid fire guns on each side of the upper deck amidships; six three-pounder guns three carried on each side of the upper deck; two one-pounder guns located on the after end of the forecastle deck, and two eighteen-inch revolving torpedo tube placed on the upper deck aft of amidships.

The vitals of the ship are protected by an armored deck of the arched type, fitted in the vicinity of the water-line and extending throughout the entire length of the vessel. Coal bunkers are so arranged along the sides of the vessel, both above and below the protective deck, as to give a miximum protection from gun fire.

Through armored tubes the ammunition for the large guns is taken to the firing point. An armored conning tower is built on the forecastle deck.

Accommodation is provided for 232 officers and men. The two masts are made suitable for taking a wireless telegraph installation with a range of 200 miles.

Under the protective deck forward and aft are placed the magazines, shell rooms, store rooms, fresh water, fuel oil, &c. Cold storage for the preserving of meats, vegetables and fish is placed above the protective deck amidships. Throughout the Fei Hung is lighted by electricity.

The machinery is of the most modern construction, embracing three propellers, with turbine engines of the Parsons turbine type, including bearings for forced oiling, lubrication pumps, oil coolers and tanks.

Two evaporators have a combined nominal copacity of 9,000 gallons of water for twenty-four hours for boilers and of 6,000 gallons of drinking water for 24 hours.

There are three boilers of the Thornycroft water-tube express type located in two fire-rooms. One is fitted for burning oil as well as coal. The total heating surface is about 14,500 square feet and the total grate surface about 271 square feet. Air is supplied to the fire by three blowers. The Fei Hung has two funnels.

Coal Co., Ltd., took place on 10th inst. The vessel was completed last year just at the time of the revolution and had been seen by most people lying off the French Bund for a considerable length of time with the other tugboats of the Han-Yeh-Ping Company. She is 115 feet long + 21 feet beam + 9 feet deep, fitted with two sets of compound surface condensing engines, steam being supplied from one marine return-tube boiler. She has a towing capacity of 1,500 tons. The sister ship Ping Tat is also well advanced towards completion and will be ready for her trial trip in the course of the next few days.—"Central China Post."

TOYO KISEN KAISHA

Appropriation of profits.

	Yen
Net Profits	386,725.280
Brought over from last account	7.636.406
Total	394,361.686
Reserve fund	2,000.000
Dividends for Shareholder	367,250.000
To be carried forward	7,111.695

The Directors were re-elected, and the meeting came to an end about 4 o'clock.

Norddeutscher Lloyd.—The report of the Norddeutscher Lloyd states that the total profits for the year 1911 amount to about m.41,500,000, as against m.38,100,000 for the preceding year, an increase of m 3,400,000. Although the North American passenger traffic showed losses of several million marks, the general state of freights to South America and Australia rendered the above result possible, and a dividend of 5 per cent. will be proposed to the shareholders at the general meeting on

April 3. The sum of m.20,700,000 (as against m.20,400,000 in 1910) has been applied to general expenses, this sum including m.1,500,000 for extra depreciation of sea-going vessels. The insurance fund has been increased by m.1,560,000, the reserve fund by m.400,000, the renewal fund by m.900,000, and the extra reserve fund by m.285,000, making a total sum of approximately m.3,000,000 (as against approximately m.2,000,000 in 1910) for the reserve funds. The company's financial position was considerably strengthened during the years, as the amount due to creditors decreased from m.36,400,000 at the beginning to m.19,500,000 at the end of the last current business year, against debts due to the company of m.18,100,000 at the end of the current year as compared with m.15,500,000 at the end of 1910. During the same period the amounts of prepaid passage money and current risks showed a surplus of m.2,000,000, being m.10,900,000 as against m.8,900,000 for the preceding year.

Proposals for Coal Boat:—HEADQUARTERS PHILIPPINES DIVISION, OFFICE OF CHIEF QUARTERMASTER, MANILA, P. I., MARCH 22, 1912.—Sealed proposals, in triplicate, for furnishing the Quartermaster Department U. S. Army, at Manila, with One Coal Boat will be received here until 11.00 a m. June 15th, 1912, and then publicly opened. Information and blank forms furnished upon application. I. W. Littell, Assistant Quartermaster General. U. S. Army, Chief Quartermaster.

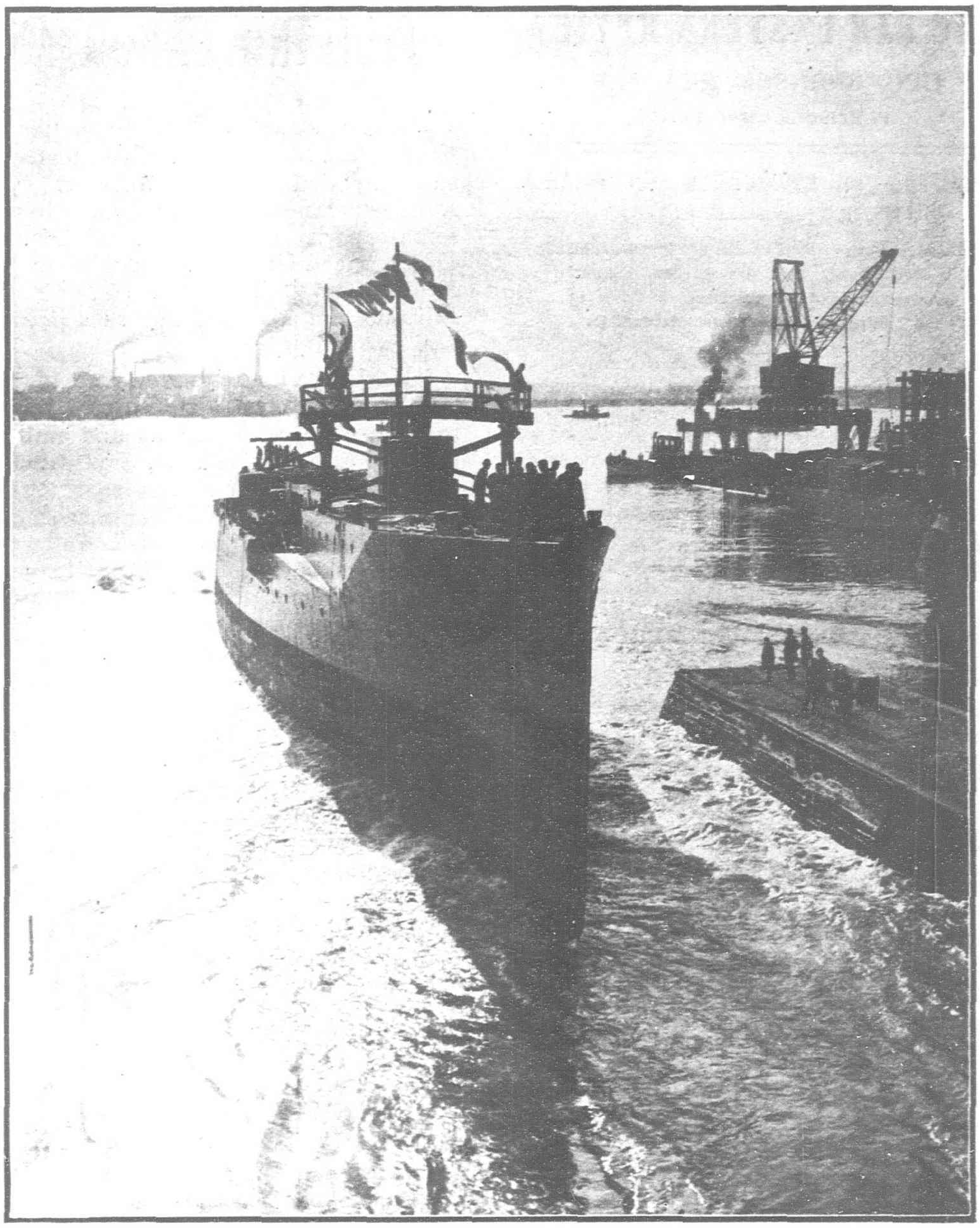
STEAMSHIP CONSTRUCTION, JAPAN.—The steamships in course of construction with subsidy promised under the Shipbuilding Encouragement Law now number ten, with aggregated tonnage of 49,500 as shown under:—

			Dockyard
N.Y.K....	Yokohama Maru...	6,200	Mitsu Bishi
,,	...Katori Maru...	... 9,450	,,
,,	...Shidznoka Maru	... 6,200	Kawasaki
,,	...Kashima Maru	...10,500	,,
,, ...	,,	... 3,500	,,
Railway Board...	,,	... 3,000	,,
,, ...	,,	... 3,000	,,
Kaiji K'kai...	Sakai Maru	... 3,500	,,
Home Office...	Noda Maru	... 1,250	Uraga
,, ...	,,	... 2,900	Kawasaki

The Noda Maru which is in course of building in the Uraga Dockyard is a dredger to be used for the improvement of the Shimonoseki Strait and the Katori Maru and Kashima Maru being built to the order of the Nippon Yusen Kaisha are to be placed on the European route, while two liners ordered by the Railway Board are to be used for connecting the services across the Tsushima Strait. The Sakaki Maru is an additional liner to the Volunteer fleet by the Marine Affairs Association.—Of these steamers the Yokohama Maru and Shidznoka Maru will be launched shortly.

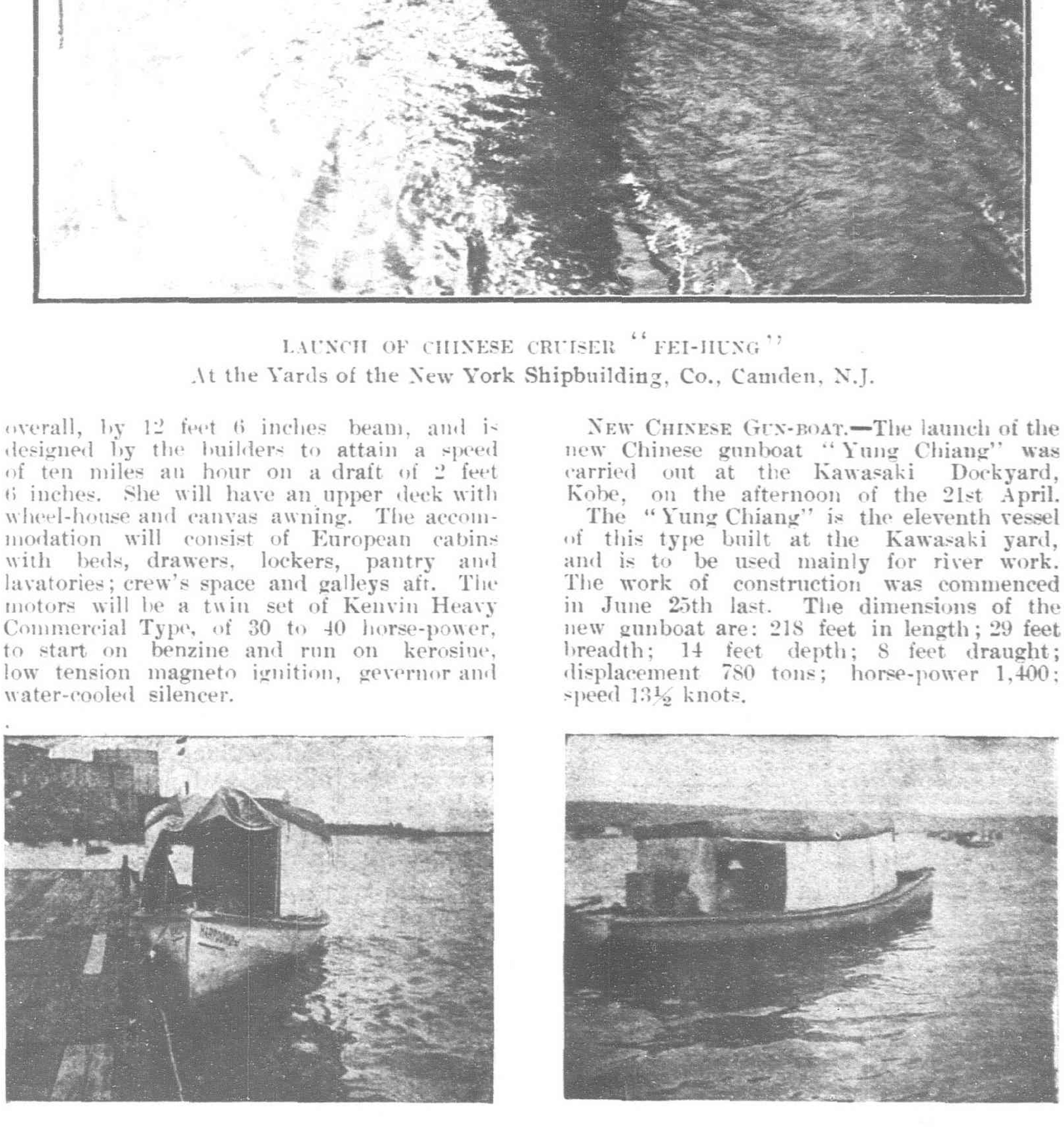
COMMISSION FOR YARROW CO. FROM U.S. NAVY DEPARTMENT.—The Navy Department at Washington, says Engineering, have paid Messrs. Yarrow and Co. a great compliment, having entered into a contract with them to design the shallow-draught gunboats which they intend to place on the China rivers. The vessels will be constructed in the United States This act on the part of the Navy Departmentant at Washington is owing to the exceptional success of his Majesty's shallow-draught gunboat Widgeon, which has made some remarkable runs on the Yangtze. The firm are building from their own design two similar boats—the Kingfisher and Rail—for the British Navy.

MOTOR HOUSEBOAT.—The Asiatic Petroleum Co. have placed with Messrs. W. S. Bailey & Co., of Hongkong, the order for a twin screw steel motor houseboat for service at Haiphong. The new vessel will be 60 feet overall, by 12 feet 6 inches beam, and is designed by the builders to attain a speed of ten miles an hour on a draft of 2 feet 6 inches. She will have an upper deck with wheel-house and canvas awning. The accommodation will consist of European cabins with beds, drawers, lockers, pantry and lavatories; crew's space and galleys aft. The motors will be a twin set of Kenvin Heavy Commercial Type, of 30 to 40 horse-power, to start on benzine and run on kerosine, low tension magneto ignition, gevernor and water-cooled silencer.



LAUNCH OF CHINESE CRUISER "FEI-HUNG"
At the Yards of the New York Shipbuilding, Co., Camden, N.J.

NEW CHINESE GUN-BOAT.—The launch of the new Chinese gunboat "Yung Chiang" was carried out at the Kawasaki Dockyard, Kobe, on the afternoon of the 21st April. The "Yung Chiang" is the eleventh vessel of this type built at the Kawasaki yard, and is to be used mainly for river work. The work of construction was commenced in June 25th last. The dimensions of the new gunboat are: 218 feet in length; 29 feet breadth; 14 feet depth; 8 feet draught; displacement 780 tons; horse-power 1,400; speed 13½ knots.



"SHORE LEAVE" NEW YORK CITY

LEAVING NEW YORK CITY HOMEWARD BOUND

THE MOTOR LAUNCH, "HARPOON II"

THE FAR EASTERN REVIEW

GEO. BRONSON REA, M.E.
PUBLISHER AND EDITOR

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CONTENTS

PAGE
The Mines of the Orient 1
The Furukawa Mining Company 1
Railway News 9
Canton-Macao Railway 10
The Canton-Amoy Railway 11
Chinese Railway Project 11
New Steamers Built by the Taikoo Dockyard and Engineering Company of Hongkong, Limited 13
Shipbuilding News 14
U. S. Army Transport Merritt 14
The C. M. S. Kiang-Wah 18
New Chinese Cruiser "Fei hung" 20
Filipino Labor and the Mining Industry 22
Hsiung Hsi Ling 23
Building News 24
The Hongkong University 24
Oscillated and Vibrated Concrete 28
General Railway 31
Miscellaneous News 32
Roads and Bridges 33
Industrial Plants 33
Electric Light and Power Plants 35
Wireless, Telegraphs and Telephones 36
Public Works 37
Cement Notes 43
Harbour Works 44
The Hongkong Law Courts 48

FILIPINO LABOR AND THE MINING INDUSTRY

Under the caption "Is cheap Labour Economical?" C. M. Eye formerly superintendent of the Benguet Consolidated Mining Co. and later in the same capacity with the Colorado Mining Co., has contributed an article to the Mining and Scientific Press, on the Filipino and his efficiency as a miner. Mr. Eye writes:—

"Having had nearly seven years of continuous experience with Filipino labour in connection with mining and milling in the Philippine Islands, I venture to offer the following remarks regarding its efficiency and possibilities, in response to the invitation extended in your editorial on cheap labour. I quite agree with Wickham Quinian that the mass of untrained Filipinos are essentially children, and that they have the possibility inherent in them of becoming good workmen. In lines requiring manual dexterity they rapidly become efficient under proper supervision.

"Practically all of my experience has been with the Filipino of the provinces. During the early days there were practically no natives outside of Manila that had any training in mining work, as, previous to the American occupation, very little mining had been done in the Islands. The use of powder in mining was practically unknown, except in a limited way in the Camarines. In the Benguet district the Igorotes had 'gophered' for many years. When the Americans came, the Igorotes were employed (and are still) in prospecting and assessment work, their pay being 50c. conant per day and 'chow.' When given contracts for assessment work they were paid from p.5 to p.7 per chipa (this being the span from finger-tip to finger-tip of a fair-sized native). I have had drifts in rock hard enough to stand up safely, but not requiring powder, driven for p.80 for the first 100 ft. When it came to regular operations, the Igorotes were found to be too undependable, however, and it became necessary to bring in Filipinos from the neighboring coast provinces of Pangasanan, La Union, and others. Some of these had had previous experience in powder and rock work on the Benguet road, and quickly became fairly good miners. They brought their families along, and settled down at the mines, and proved to be steady and reliable. When there was any scarcity in labour, these people sent for their friends and relatives, so the supply was kept up, and I can only say that after the first importation there were never any but temporary shortages in labour while I was in this district. The wages paid (p.1 per day with rations, or p.1.20 without) proved sufficiently attractive to bring the best class of labour from the lowlands to the mines.

"One mine in this district employed a few experienced Japanese miners to good advantage, using them mostly as timbermen and hard rock men, and paying them from p.2 to p.2.50 per day. Native timbermen were paid p.1.20 per day with 'chow,' and capitases p.1.40 to p.1.50. Since I left here two years ago, the rates have gone up about 20 c. conant all around, but are not high, considering that the men receiving them have become more experienced. The rates paid in the Camarines have, I believe, been somewhat higher than those given above, but the grade of the labour there was better to begin with. In the Aroroy district, Island of Masbate, the base rate for miners is a peso per day without chow; that of common labour being 80c. conant: timberman receive p.1.20 and capitases p.1.50 without chow. The efficiency of the labour there is not nearly so high as in Benguet, owing largely to the fact that it is recruited mostly from the Visayans of the surrounding country, and partly to difference in climatic conditions. The best men in that district have been brought in from Benguet and the Camarines. These imported men come to mine, and have no other interests to interfere. The local labourer works at the mines at times when crops have been planted and fishing is poor, or when he needs a little ready money.

"I have found, both in Benguet and Aroroy, that one of the best incentives to work for the native is to run a well stocked company store where he can get rid of his money and at the same time get something that adds to his comfort and welfare—in other words, to increase his wants by providing what he needs. When the native once gets a start he is very fond of good clothes, and will buy the best. It has often been remarked in Baguio that a man who has been at the mines very long can be picked out by the superiority of his dress. A tailor was employed in connection with the company store at one mine in the district.

"It is a very difficult matter to establish any exact ratio of efficiency between men of different races working under such different conditions as exist here and at home, but I shall nevertheless try to fix such approximate ratios as appear to me to exist, using that of an average miner in the West as 100%. On this basis, I would regard that of a native miner in Benguet, after having had six months experience, at 33⅓% and that of a miner of similar experience at Aroroy at 25%. In timber work, their percentages would drop somewhat, owing to lack of previous training of the natives and their comparatively small stature (average height being about 5 ft. 4 in., weight about 130 lb.) The efficiency of a common labourer in Benguet I would put at 25% and in Aroroy at 20%. In all cases, it must be understood that the labour has proper and capable supervision, and that no comparison is attempted between the native and the white working under the same conditions. The white man could not do the work of a native in this climate and stand up under it, so it is fortunate that it is not necessary.

"In milling work, where quickness and dexterity come more into play, I have found that native boys break in quickly, and in this work I would place the relative efficiency at 40% as compared with the average mill-hand without special training. For this work the smaller and younger men are the best, being more alert. It is necessary to avoid giving each boy too much to look after and to have good supervision to keep them up to the mark. Granting these, I would as soon operate with a good bunch of native boys as the average lot of millmen of equivalent experience at home. When it comes to lines requiring special mechanical training, it as yet necessary to draw on Manila. Good native machinists can be hired for provincial work at from p.75 to p.90 per month, and in efficiency the work of these men would be from 40 to 50% of that of white machinists. Engineers get from p.50 to p.60 per month, and firemen from p.35 to p.40, all without chow. The efficiency of the latter is about the same as with machinists.

"The general conclusion may be drawn with respect to labour in these Islands that the efficiency increases with proper training faster than the rate of wages. This makes the outlook, with a liberal supply of raw material to draw upon, very promising, provided that the people are not misled by agitators. I regard the policy of the present Government in providing liberally for the education of the native, especially in industrial lines a very wise one. It has been my experience that the boys who have been to school and speak English are quicker to learn and more ambitious than those fresh from the bosque. For timber construction and minetimber framing I have always employed Japanese carpenters, for the reason that they are very efficient and accurate. The Filipino is as yet lacking in skill in carpentering and smithing, but the schools are giving instruction along these lines, and the natives working with the Japanese as helpers are learning slowly, so it may be possible to eliminate the Japanese carpenter after a while, except for the finer work on construction.

"Altogether, the labour situation (upon which everything here depends) is not so bad as has been painted, and it will continue to improve, if those in charge of industries here will do the right thing and make the necessary effort to improve the quality of the work and look out for the personal welfare of their employees. Nowhere is scientific management more necessary."

HSIUNG HSI LING

With sixty thousand taels in the treasury at Peking, and thirty thousand at Nanking, the Republican Government assumed control of the destinies of the great Chinese nation. The Minister of Finance, Hsiung Hsi Ling accepted the difficult task of straightening out the tangled finances and providing funds to meet the urgent demands of the army and government. Confronted at the outset by a deadlock between the foreign bankers and the new government, arising from the signing of the Belgian Loan by the Premier on March 14th, five days after a firm option had been ceded to the International groups by the President, the task of the new Financial Minister was beset with great difficulty. From all parts of the republic telegraphic appeals and demands for funds poured in on the new Minister. The Commander-in-chief at Nanking, General Hwang Hsin, kept the wires hot with frantic appeals for cash to pay his troops or he would not be responsible for their behaviour. The Governors and generals of all provinces emphasized the urgency of immediate remittances for the troops or imperative administration expenses. The small sums collected from taxation were disbursed as soon as received. The internal loan from which great things were expected was a failure. Even at 8 per cent. for five years, the Chinese refused to subscribe any large amounts at par, and officials were hastened abroad to sell the bonds to the Chinese of the Philippines, Straits Settlements, Java and elsewhere at a discount. In Shanghai $35,000 of the bonds was sold at 75, and there is reason to believe that anyone who would subscribe to a block of over a million could secure the bonds as low as 66. The only course left open to the Minister of Finance, was to raise foreign loans, and here he faced the deadlock created by the Premier of his cabinet. With no other alternative he accepted the situation and resumed negotiations with the Foreign banks and paved the way to a more friendly feeling. It was only natural that a clash between the Premier and Finance Minister should follow, and that both would tender their resignations and it is also natural that the President would refuse to accept them. The Premier held his ground against the monopoly of the International groups, with their stipulations as to auditing or control as a condition to loaning any large sum, and vigorously defended his action in negotiating with the Belgians. The groups maintained their position in refusing to advance further funds until the Belgian Loan was cancelled, and their terms were accepted. Any solution of the problem carried with it, a blow to the Premier's prestige, and recognition of the foreign demands.

Each day the situation throughout the republic was growing worse, and heroic efforts were made to satisfy the demands of the unpaid soldiery. Provincial loans were raised in several instances, to tide over the crisis, and the spectacle was presented of a government pleading on the one hand for funds to disband the army and return the soldiers to their homes to prevent disorders, and on the other, the provincial authorities raising loans on local revenues, conditional in purchasing war material from the lenders to the full extent of the loan during the next five years.

It required a man of tact and judgment to break the deadlock, and relieve the situation.

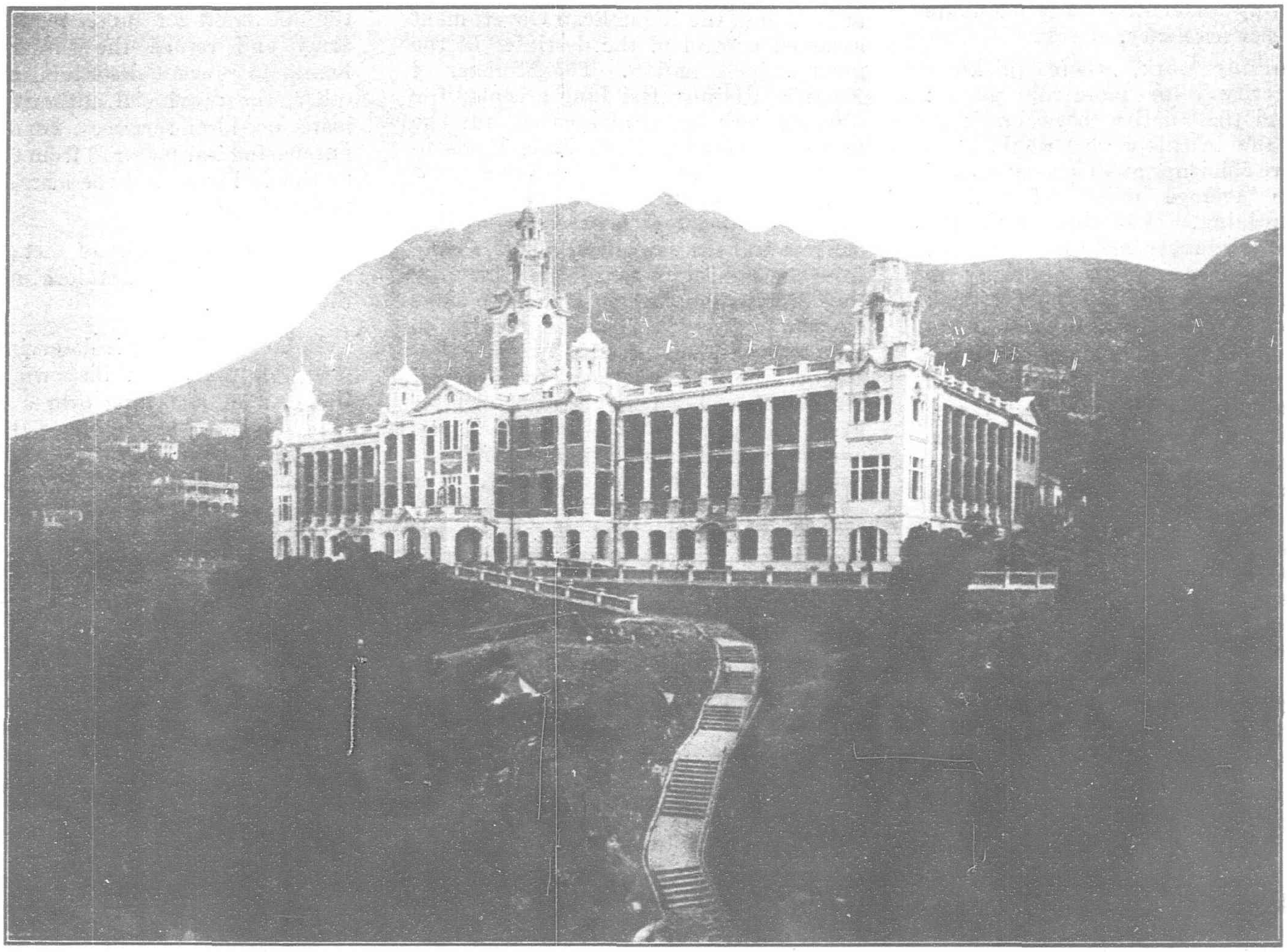
Hsiung Hsi Ling is deserving of great credit of taking on his own shoulders the task of smothing over a situation, which might have plunged the country into another period of turmoil and unrest, had the policy of the Premier carried through. Somebody had to cede, and Hsiung reopened negotiations with the International bankers, and was successful in securing several advance payments pending the acceptance of final terms. Had the Minister of Finance been permitted to administer his office without interference there is every reason to believe that satisfactory final terms would have been agreed upon, but no sooner was the advances of the foreign banks paid over, when a campaign against foreign loans was started throughout the republic.

Those who were most persistant in telegraphing demands for funds in order to avoid a revolt of the soldiery, turned around and telegraphed vehement messages charging the Finance Minister with selling the country to the foreigners.

His efforts were misunderstood and misjudged. His life was menaced and he was condemned as a traitor, and his fellow provincials threatened to disown him and destroy his ancestral tombs. Hsiung handed in his resignation again, and addressed an open letter to the country, in which he laid bare the inner secrets of the financial situation. A more gloomy document is hard to imagine.

The foreign financiers who were willing to treat with Hsiung maintained that supervision of the expenditure of any loan, must be a condition to advancing the funds, and that during the life of the loan, no other loans should be raised from other parties, and that the loan should not be employed for national defence or enterprisers in Manchuria or Mongolia. Negotiations have been dragging along from day to day, without reaching any conclusion, the Chinese holding out against any interference in the expenditure of the funds, and the groups as firmly insisting on this clause.

BUILDING NEWS



THE HONGKONG UNIVERSITY

Presented to the Colony of Hongkong by the late Sir Hormusjee Mody, Kt. Opened by His Excellency the Governor, Sir Frederick Lugard, G.C.M.G., C.B., D.S.O., on the 11th March, 1912

THE HONGKONG UNIVERSITY

Hongkong University, the institution founded and endowed by a number of British, Parsee, and Chinese gentlemen for the education of Chinese young men, and organized under the patronage and control of the government of Hongkong, was formally opened on March 11 by Sir Frederick Lugard, retiring governor of the colony, with elaborate ceremonies in which the Chinese residents of Hongkong took a prominent part.

The university starts with a complete building equipment and an endowment of $1,429,099 local currency. The building was constructed by the late Sir Hormusjee Mody, a Parsee merchant of Hongkong, as his contribution, at an expense of $180,000 local currency. The endowment includes subscriptions from Chinese sources, mostly from three Chinese residents *of the Straits Settlements, amounting to* $751,179; British and other subscriptions in the East, $144,650; British subscriptions in Great Britain, $466,564; and interest and other items, $66,706. The Faculty is substantially British in all lines but Chinese language and kindred subjects.

The assured income of the university from the beginning will be about $100,000 local currency, or something like $45,000 gold, per annum, including $14,000 local currency per annum appropriated by the legislative council of Hongkong as government support.

The buildings include the main edifice, a house for a married Principal, and houses for two married professors, or four bachelors. The main building is calculated to afford lecture rooms, etc., for the accommodation of 500 Under-graduates, and it is planned so as to be capable of extension. The chief feature is the Great hall, 80 feet by 50 feet with domed roof 43 feet high. There are 11 class rooms and 8 laboratories and workshops, with libraries, a common room for students and committee rooms, offices, coolies' quarters in basement, etc. It is built on perhaps the finest site available for the purpose in the Island in the neighbourhood of the Hospitals and Mortuary, whose proximity is a necessity for instructional purposes for medical students. It is located on the side of a hill and in addition to the large area required for the buildings it has been found possible at great cost by cutting and by retaining walls to provide a level playground 275.×275ft. The site has been given by the Colonial Government *together with a large area immediately adjoining* for Residential Quarters for Students and a smaller area for the erection of an Anatomical Laboratory. The whole comprises an area of 709,789 sq. ft. and is situated 200ft. above the sea, overlooking the City of Victoria, with a magnificent sea view over the Harbour. Immediately below it is the site upon which the Church Missionary Society are building a Hostel (separated only by a public road from the University grounds), and it is understood that on the adjoining site the Roman Catholic Mission will probably build their Hostel, while immediately above it and also conterminous with the University precincts is the area acquired by the London Missionary Society for a similar purpose. The cost of the buildings and preparation of the ground which has been borne by Sir H. Mody is approximately $176,297. The value of the sites given by the Government is estimated at $176,297. The cost of the Anatomical Theatre is estimated at $28,450. This sum has been separately raised by the Chinese and Mr. Fisher has volunteered his services an architect. So far as the buildings are concerned there remain to be provided: (*a.*) Residential quarters for students; (*b.*) Fittings and furniture for the whole of the University buildings, and (*c.*) Equipment and Apparatus for the Laboratories and Workshops.

UNIVERSITY ENDOWMENT FUND.—In the statement giving the "Present Position, Constitution, Objects and Prospects" of the Hongkong University, the *position* of the Endowment Fund is summarised as under:—

Chinese subscriptions	$751,179
British and others—In the East	144,650
British—At home (£870 13.0)..........	9,421
Promised by John Swire & Sons and allied firms £40,000 @ 1/9...........	457,143
Interest, etc., $68,464 (less $2,250 expenses)*	66,706
Total	$1,429,099

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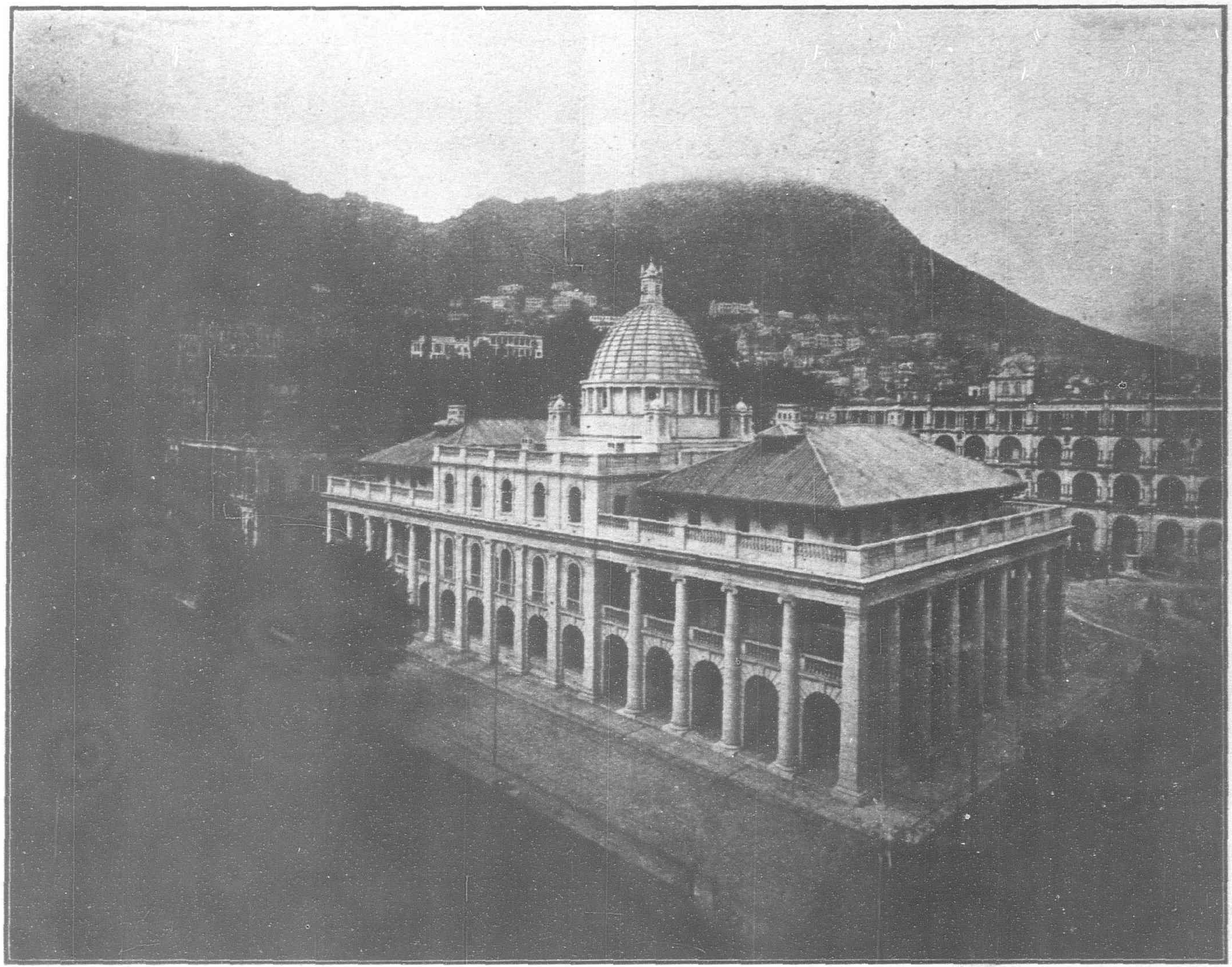
* Includes salary of Registrar, and grant of $1,000 to College of Medicine and fee to draftsman of Ordinance, $500.



THE HONGKONG LAW COURTS

Of this sum $157,000 is hypothecated to Scholarships, the interest on which will accrue to the University (in lieu of the scholar's fees) whether a scholar has been nominated to the scholarship or not. From it must also be deducted the sums necessary for the Furnishing and Equipment, and the building of the students quarters, but when the quarters are occupied the rent will provide interest on the loan.

Siam.—In view of the many public building projects in operation and contemplation, such as city waterworks, sewerage system, hospital and other buildings, and private building enterprises, there will be a growing demand for building materials of all kinds, in which bricks, tiles, and cement will be extensively used.

Up to the twelfth century laterite and sandstone blocks were used in the construction of the ancient temples and palaces of Siam, but following this period brick, mortar, and plaster formed the building material, which has also continued to be used for the more permanent buildings to the present time.

The brick and tile industry is in the hands of the Chinese and, as labor is comparatively cheap, very little machinery is employed in this industry. There is an abundance of good clay in the Me Nam River Valley suitable for the manufacture of bricks and tiles, and with proper machinery a profitable business may be established in this line.

The number of bricks imported for last year was 188,989, valued at $6,635, and the number of tiles, 1,085,430, valued at $35,257. The greater part of these were supplied by the United Kingdom.

Burma.—The Public Works Department of the Government of Burma (Construction Department) is engaged in erecting a new building for the Government printing press in Rangoon.

The Rangoon city council has under consideration the erection of a new municipal building. Nothing definite will be decided until the budget for the fiscal year commencing June 1, 1912, comes up for decision in March. The present municipal building is not in good condition and inadequate for the various offices.

A new railway depot in Rangoon is now under construction by the Burma Railways. Freight sheds are also being erected and the yards are being extended. The depot is to be a two-story brick structure.

New office buildings, all steel-framed brick structures faced with cement, each three and four stories high, are being constructed in Rangoon by Sofaer & Co., Thos. Cook & Son, E. M. de Souza & Co., Robinson & Mundy, G. McKenzie & Co. The ground floor of the last-named is to be used as a garage and automobile salesroom.

Siberia.—It is reported that the Government has assigned $300,000 for erecting a separate building in Vladivostok for a boys' high school.

Khabarofsk, the capital of the Priamur districts, has experienced a steady and progressive growth in the past four years and last year enjoyed a healthy building extension.

Tsingtau.—There is great activity in building operations at present in Tsingtau. About 50 buildings are under construction, new land is bought every day, and new plans filed. Under these promising conditions there is a good demand for building supplies and machinery.

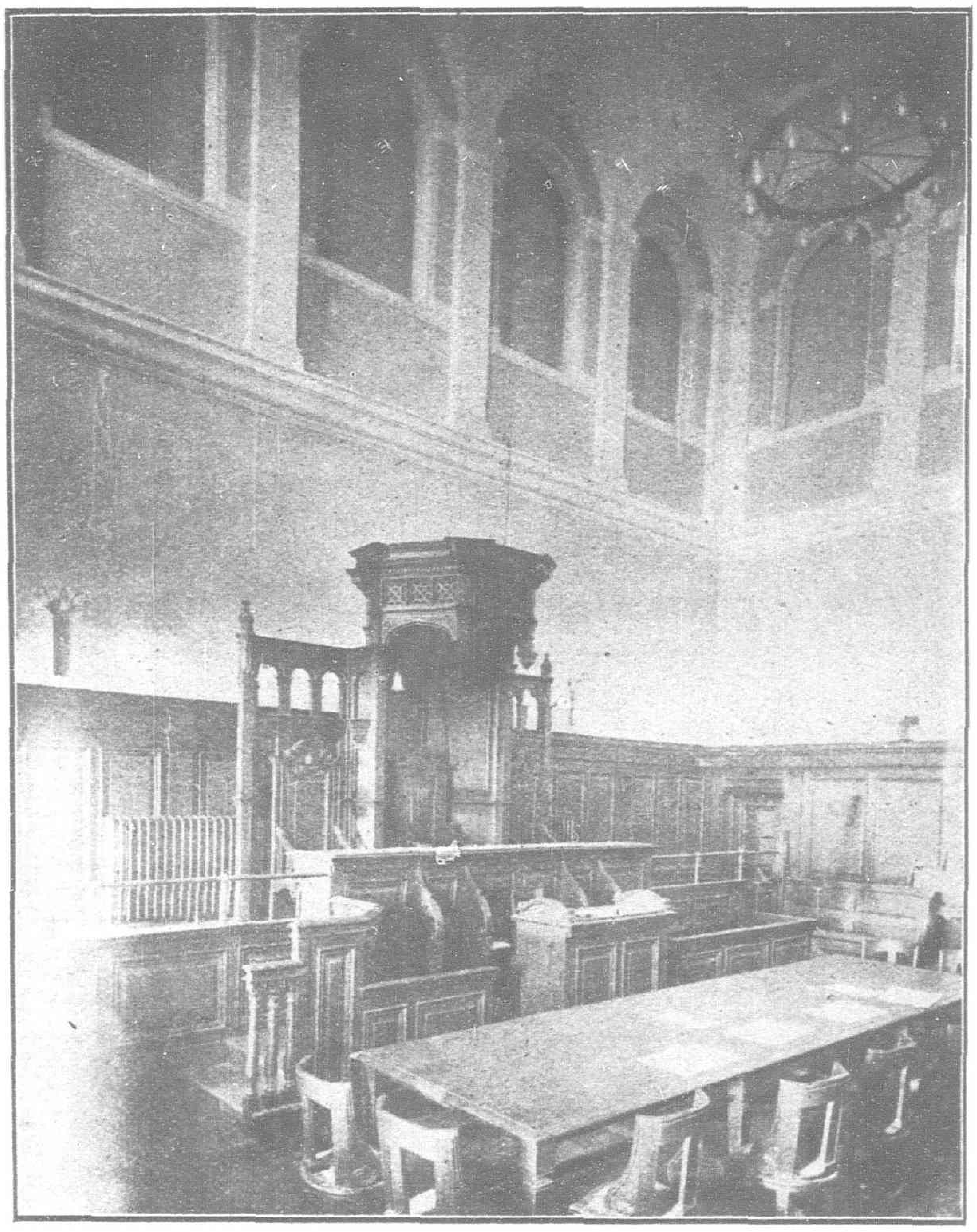
Philippine University Buildings.—The Bureau of Insular Affairs at Washington furnishes the following note in regard to buildings for the University of the Philippines.

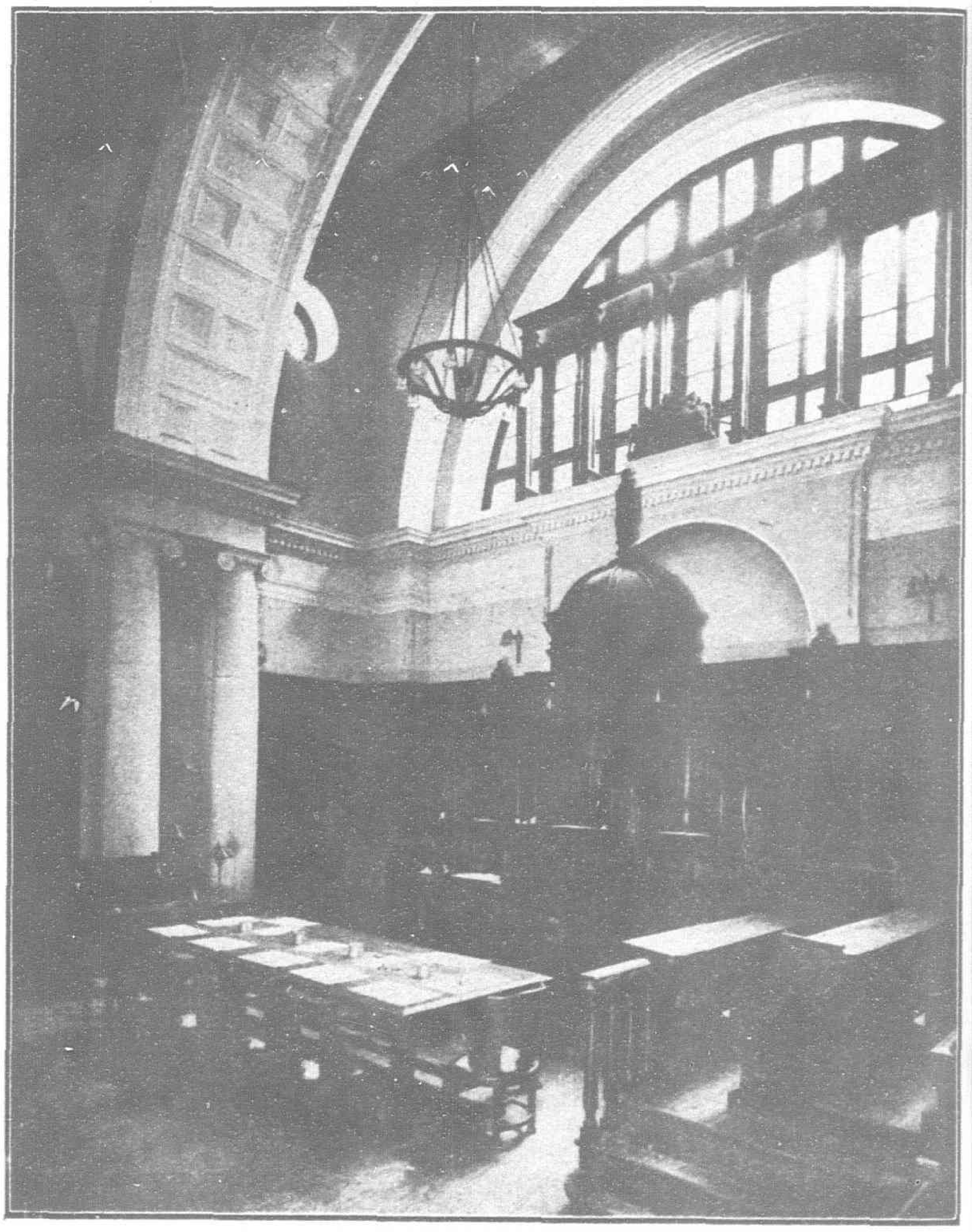
An appropriation of $125,000 gold for the construction of buildings for the University of the Philippines, which was made during the last session of the legislature, is now available. Plans are being prepared in the office of the consulting architect, William E. Parsons, and when completed and approved will be turned over to the Bureau of Public Works (at Manila). The bureau will then advertise for bids for the construction, and actual work will be commenced as soon as these are accepted.

The university now has permanent structures for the medical college, which is located on Calle Herran, the veterinary college at Pandacan, and the agricultural college at Los Banos. The new building, which will be used for administration purposes, will be located on the campus, near Calle Padre Faura. The present legislature will probably appropriate a sum which may be used for the construction of buildings to house the other colleges of the university, which are now located in temporary structures, most of which are rented by the Government.

FORMOSA.—With an appropriation of $75,000 the construction of a technical and industrial school in Formosa has begun in the prefecture of Taihoku at Dainan-sho. The school is intended for the natives (Chinese), and the course will cover three years; graduates will be employed in the railway and public works' departments.

SIBERIA.—*An agricultural school* is to be established at Nicolsk-Ussurisk. This school will be the first of its kind in the Russian Far East. The Ussuri Cossacks also desire to establish a similar school at Station Bikin. They are willing to subscribe a fund of 10,000 rubles ($5,150) for its establishment and to pay 1,200 rubles ($618) per annum toward its support, and also grant 50 dessiatines (1,350 acres) of land for the purpose.





INTERIORS OF HONGKONG LAW COURTS

CLARKE'S NEW FACTORY.—A new three-storey reinforced concrete factory building is being constructed by M. A. Clake at No. 12 Calle Misericordia, Manila, and is expected to be completed in June.

A shipment of machinery from the United States has been received which includes a complete ice and cold storage plant, machinery for a coco-cola bottling, seven-foot coffee roaster, a coffee granulating machine, candy machinery, elevator outfit, and other machinery and fixtures necessary for the manufacture and preparation of the products that will be turned out.

The ice and cold storage plant, will have a daily capacity, of fifteen tons. Water for the ice will be supplied from an artesian well 800 feet deep which has been bored on the promises and has a good flow of water. This water has been analyzed by an expert chemist who pronounces it to be well balanced in all essential minerals that go to make good, palatable drinking water. The ice and cold storage plant was manufactured by the Frick Ice Machine Company of Waynsboro, Pa., and the cold rooms designed by an expert of that establishment.

NEW CLUB HOUSE, CEBU.—The Cebu Club is preparing to erect a handsome club building containing social and recreative quarters for the members and equipment for all kinds of athletic games. Articles of incorporation have been taken out with the executive bureau for this purpose, the papers being signed to-day by Second Assistant Executive Secretary Manuel Yriarte.

Directors and incorporators of the reorganized club are as follows: Arlington Pond, F. B. Richards, H. B. Walker, A. J. Moore, J, W. Cairns, H. S. North, and W. A. Muir.

PROPOSED NEW DOCK AND WAREHOUSES.—The Standard Oil Company has renewed its application to the insular government for an allotment of space on the Malècon-Luneta fill and if it receives favorable consideration will erect a large pier and a storage plant. This project has been under consideration for several years and has been brought to the point of action by the recent destruction of the company's plant at Pandacan. It is necessary to erect another storage plant and if the government gives its sanction the combined pier and storage scheme will be carried out.

The plans of the company call for a large modern pier capable of accommodating the largest steamers that enter the port, the cost of which is estimated at P.800,000. The shore plant will provide for the concentration of all the business of the company in Manila, including, besides the storage department, administrative buildings, shops, etc. These structures will cost in the neighborhood of P.700,000, so that the joint investment will be about one and a half millions.

The entire storage plant will be constructed of reinforced concrete and made as completely fireproof and safe as modern construction permits.

Secretary Elliott has promised to pass upon the application within a fortnight and if a favorable judgment is given construction will begin at an early date.

NEW BUILDING FOR YOKOHAMA SPECIE BANK, SHAGHAI.—The Yokohama Specie Bank, which recently purchased land at the north corner of the Bund and Kiukiang Road, will erect a building on the property.

The newly acquired property is probably the most valuable in Shanghai. Though assessed at Tls. 100,000 per now, the Japanese bank paid Tls. 362,000 for the land, which comprises slightly more than one mow and a half. There is a two-story building on the property at present, which is in the center of a block of bank buildings.

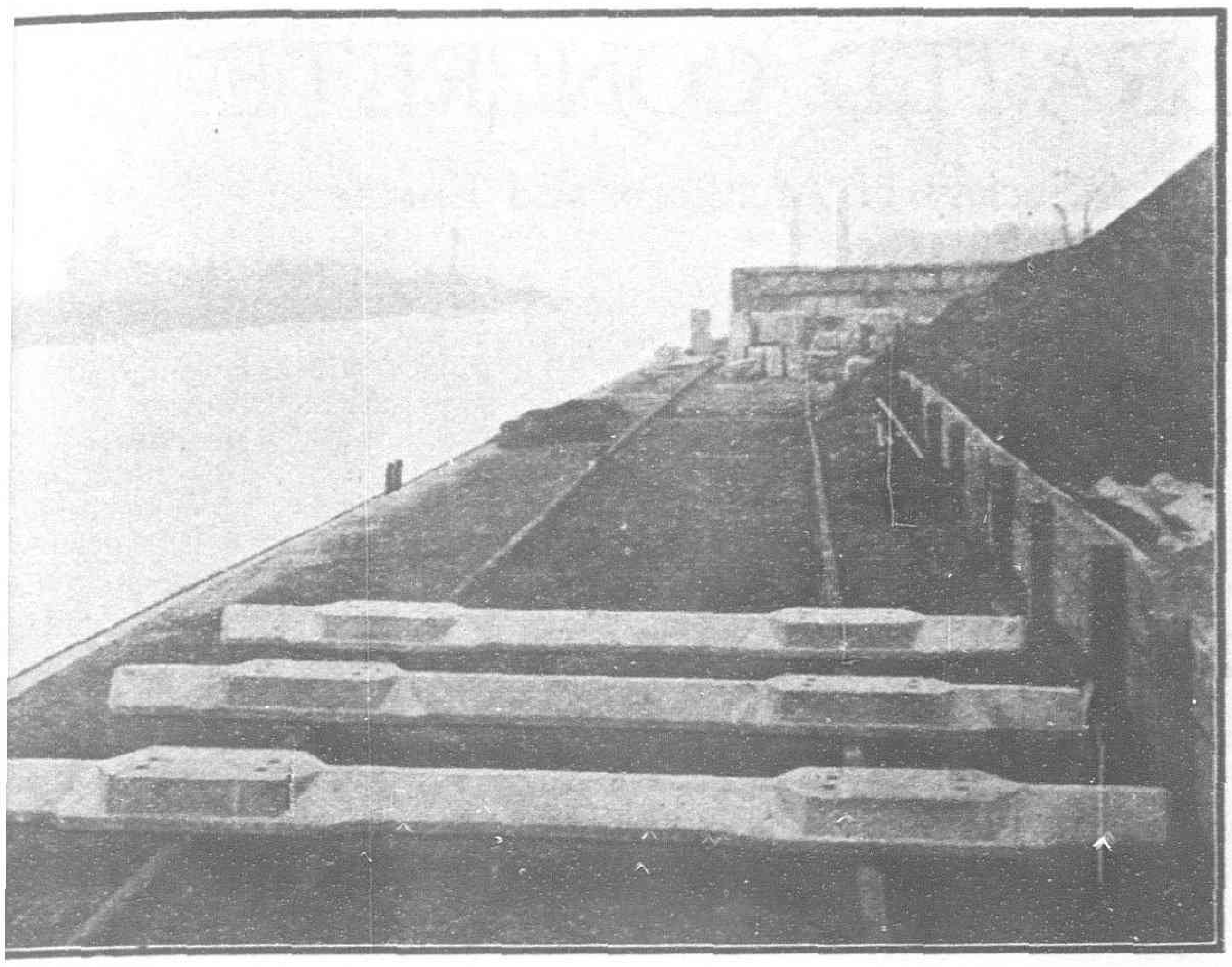
F.M.S. NEW BUILDINGS.—The Negri Sembilan Government has invited tenders for the construction of new Government offices for Seremban. The building which is to be erected will cost upwards of $75,000 gold.

The central fire station at Ipoh is estimated to cost $40,000 and the new post office to be erected there next year $60,000. It is also proposed to spend $145,000 next year on the construction of the new hospital for Ipoh.

A road from Tronoh to the Perak River, about 7 miles in length, will be constructed next year at a cost of $50,000.

MASONIC TEMPLE, MANILA.—A Masonic Temple will be erected on the Escolta on the site occupied by the old English hotel.

(*Continued on page 43*)



g. 1.—

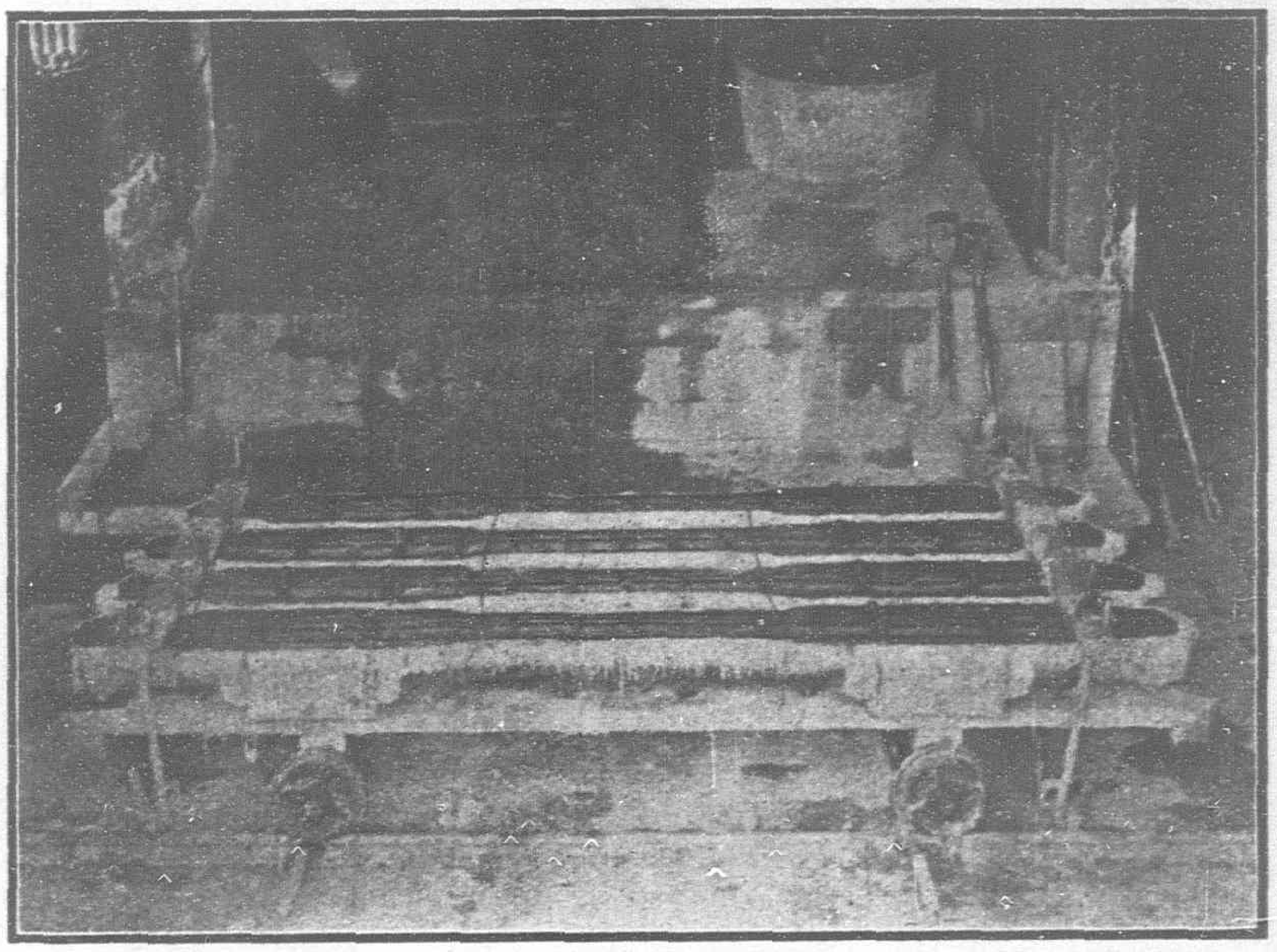


Fig. 2.—

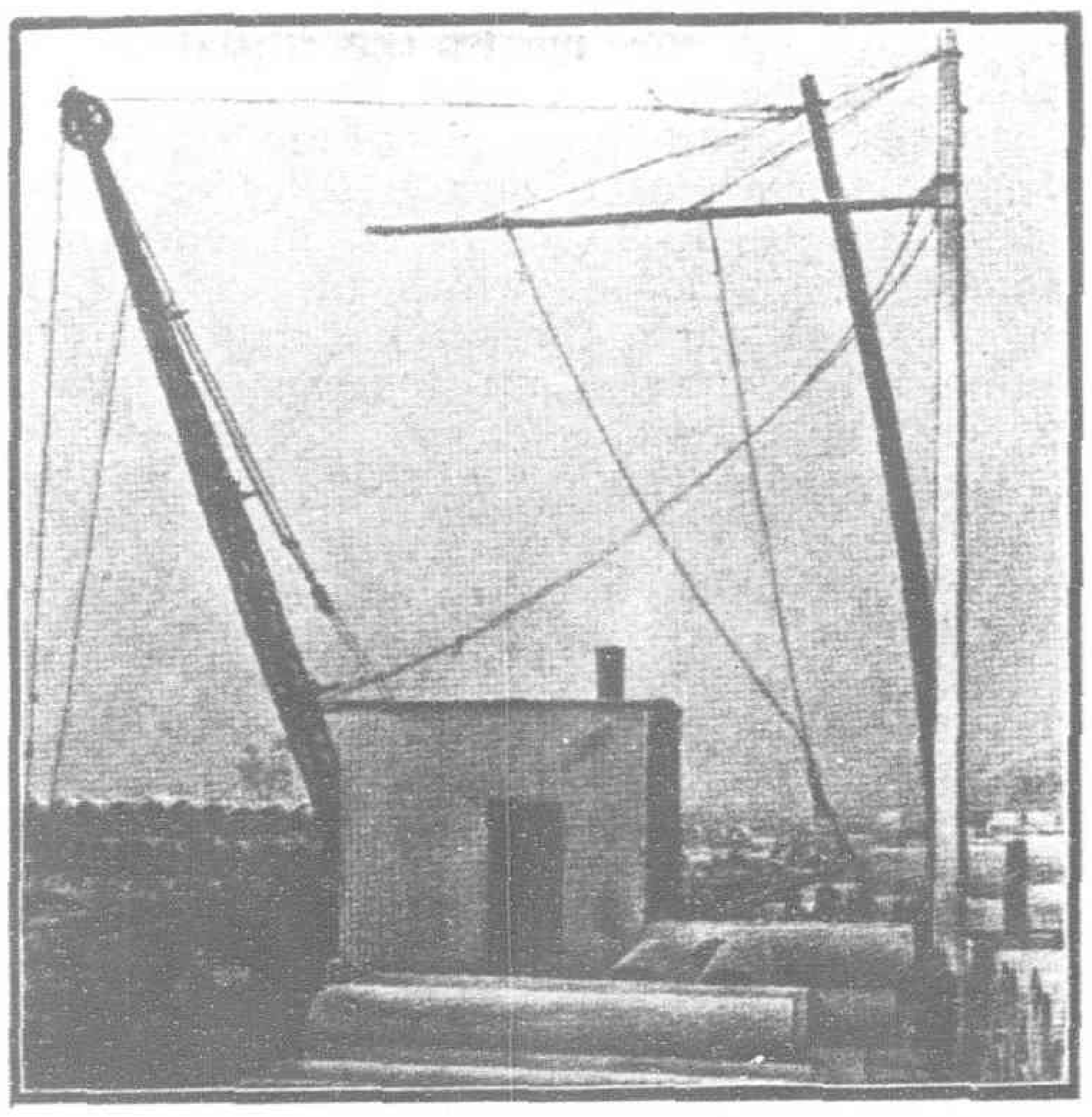


Fig. 8.—

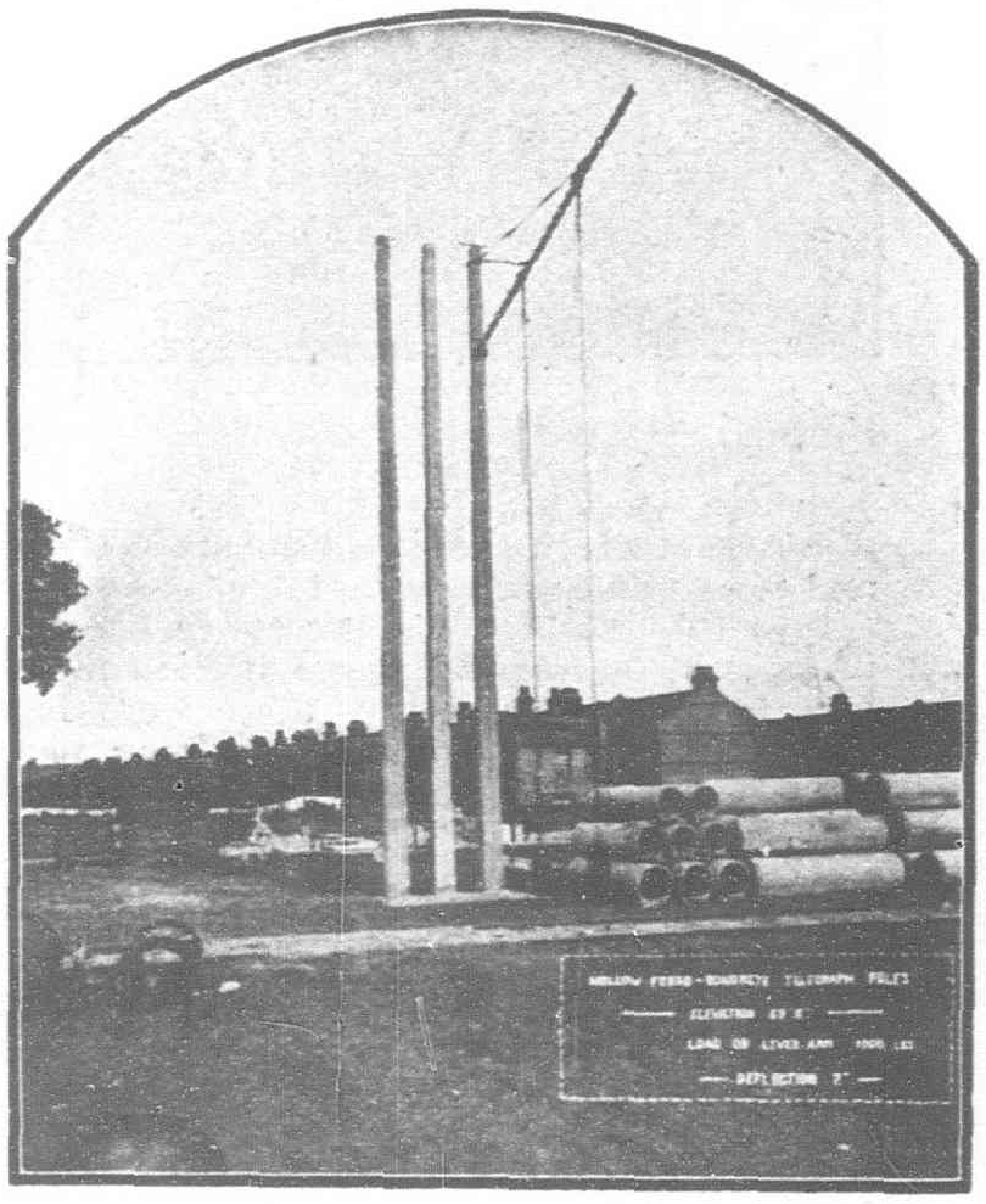

HOLLOW FERRO-CONCRETE TELEGRAPH POLES
ELEVATION 43 F.
LOAD ON LEVER ARM 1000 LBS
DEFLECTION 7"

Fig. 6.—

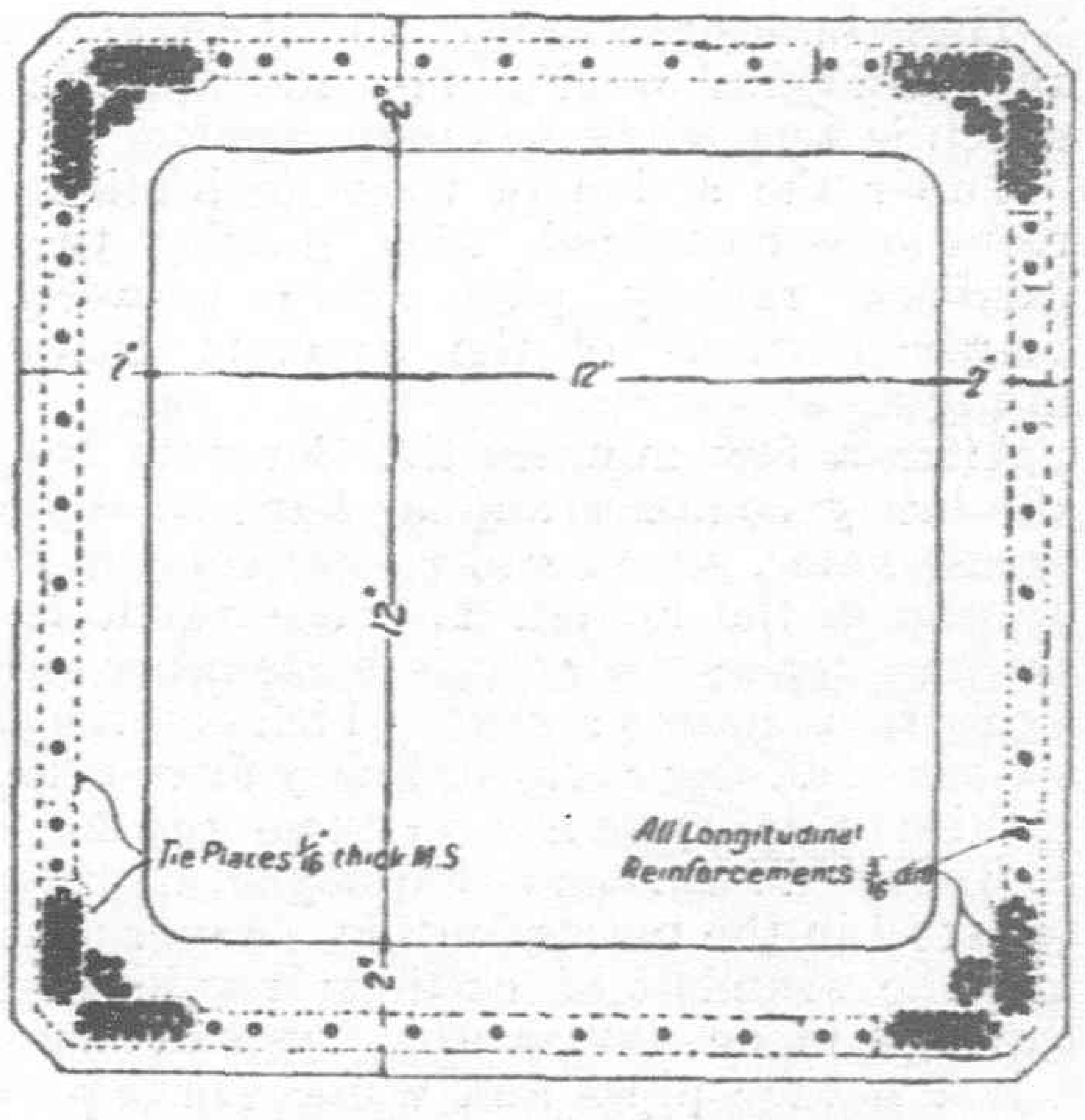
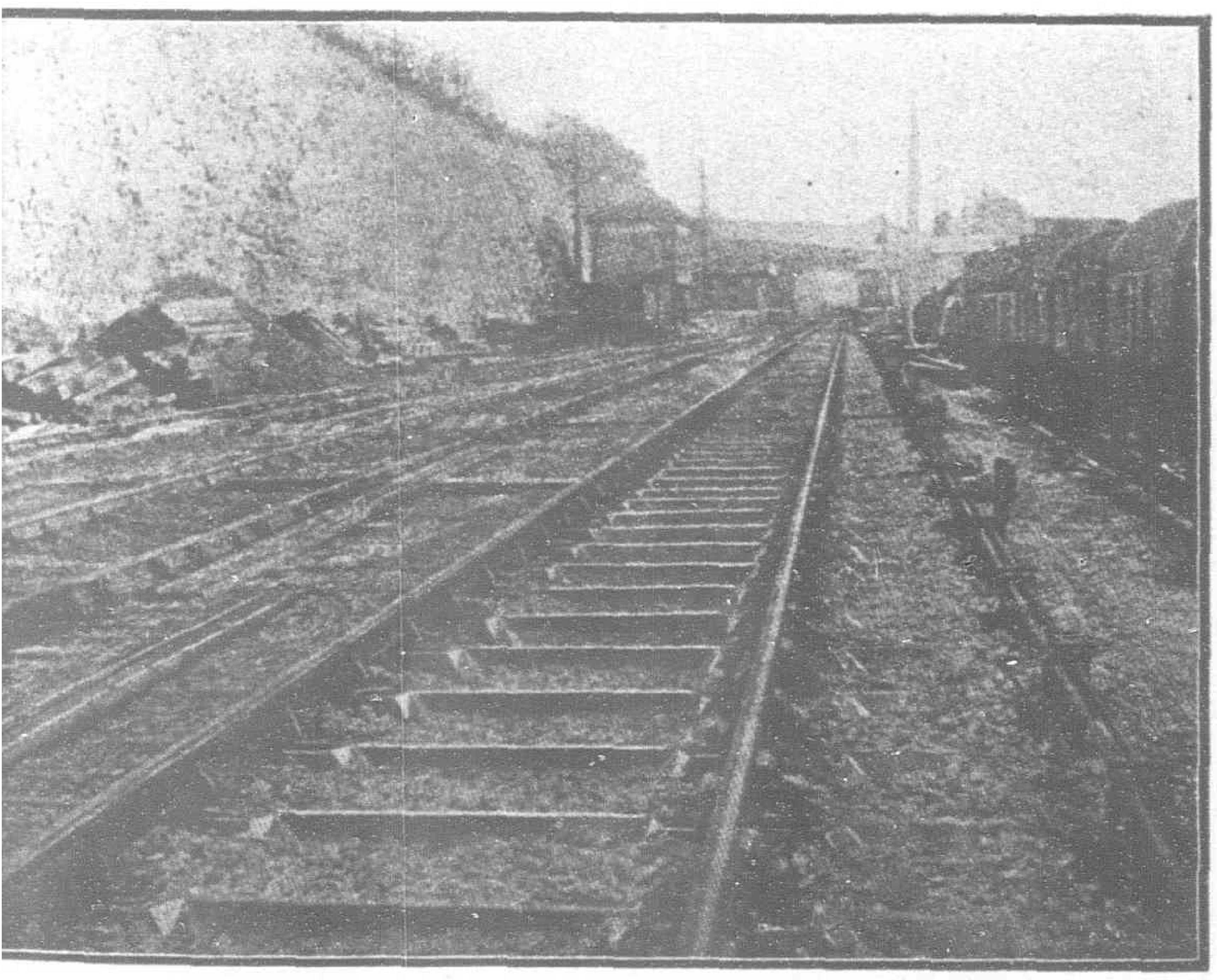

2"
2"
12"
12"
2"
2"
Tie Plates 1/16" thick M.S
All Longitudinal Reinforcements 3/16" dia

Fig. 7—SECTION OF BOTTOM OF POLE



g. 4.—

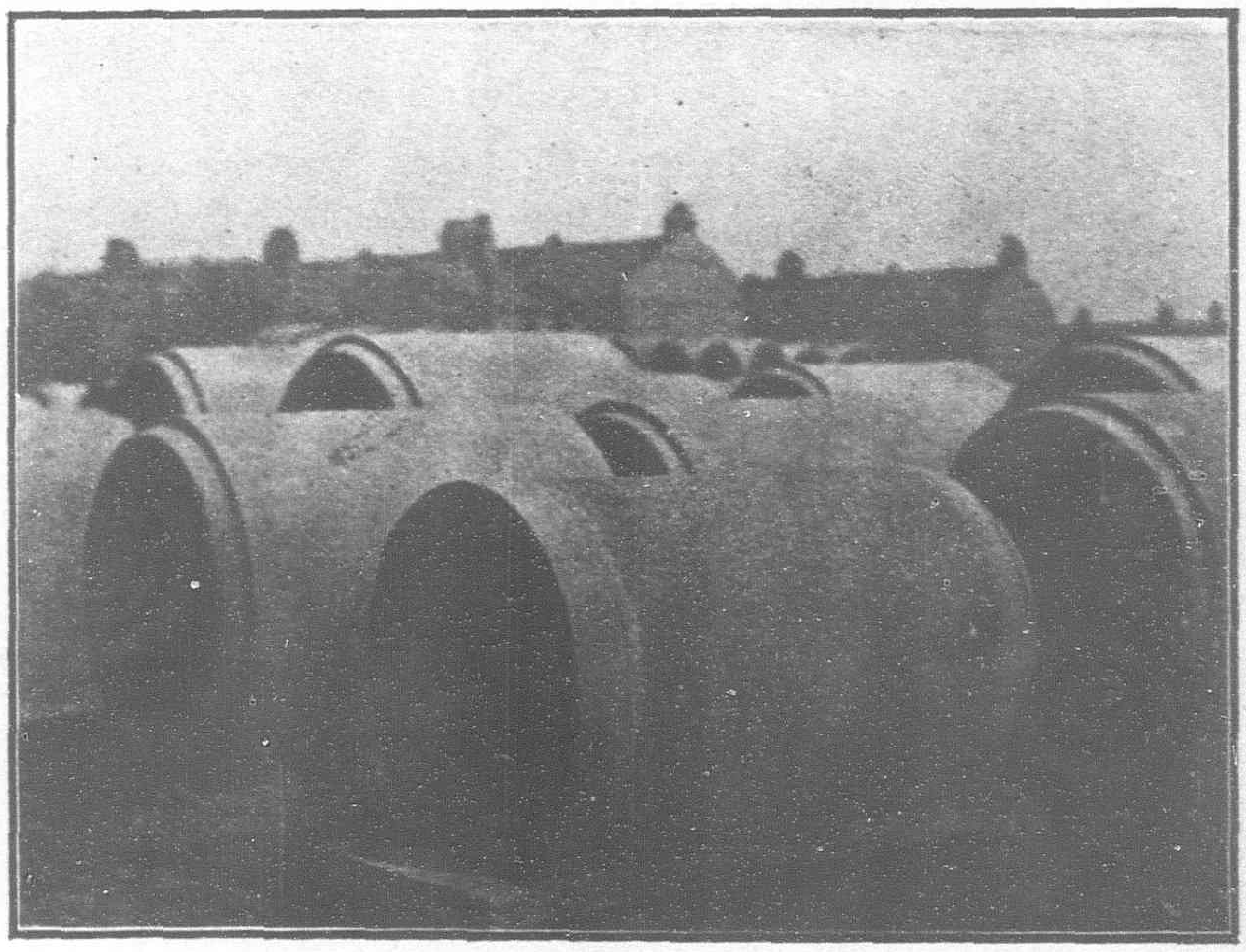


Fig. 9.—

OSCILLATED AND VIBRATED CONCRETE

Paper read by E. Bruce Ball, before the Shanghai Society of Architects and Engineers

Reinforced Concrete buildings and structures are now so universal that it is only natural that the method should be extended to the production of standard articles, and as I have had occasion recently to investigate this branch of manufacture, I think a description of the most scientific of the processes might not be without interest to the Members of this Institution.

There are several systems in vogue of making Concrete castings, but none to my mind are so advanced and obtained such remarkable results as the "Jagger" process.

The articles manufactured under this process are essentially machine made as distinguished from hand made castings.

A cast iron mould the exact form of the article to be produced is made, with provision for accurately locating the reinforcing wires or armature, and the Concrete mixture after being poured into this mould, has, through the medium of a special machine or table, imparted to it a rapidly oscillating and vibrating action.

The effect of the vibration causes the Concrete to flow uniformly into every part of the moulds, all ramming by hand or mechanical means being thus done away with.

These tables are subject to alternate vertical and horizontal oscillations, the amplitude of which is very slight but very rapid.

Under the action of these oscillations and vibrations combined with gravity the fine particles rapidly pass down between the coarser portions of the concrete completely filling up all spaces.

After a few minutes the Concrete becomes absolutely compact and as hard as stone, all excess water, scum, and excess cement rise to the top of the mould, and the result is that castings made under this system are entirely free from hair cracks, which is the most serious of all defects in ordinary ferro-concrete.

With this system armatures of the most complicated form can be employed, distributing the steel in the most scientific manner possible, and the soundest of castings result—in fact, castings made under this system, such as spigot sewage pipes and water works pressure pipes, are so perfect that when struck with a hammer in the most fragile parts they give out an elastic ring very similar to cast metal pipes.

The remarkable capacity of these machines for producing homogeneous castings was beautifully illustrated by a mould composed of a case of which the sides were made of glass, and placed on the vibrating table.

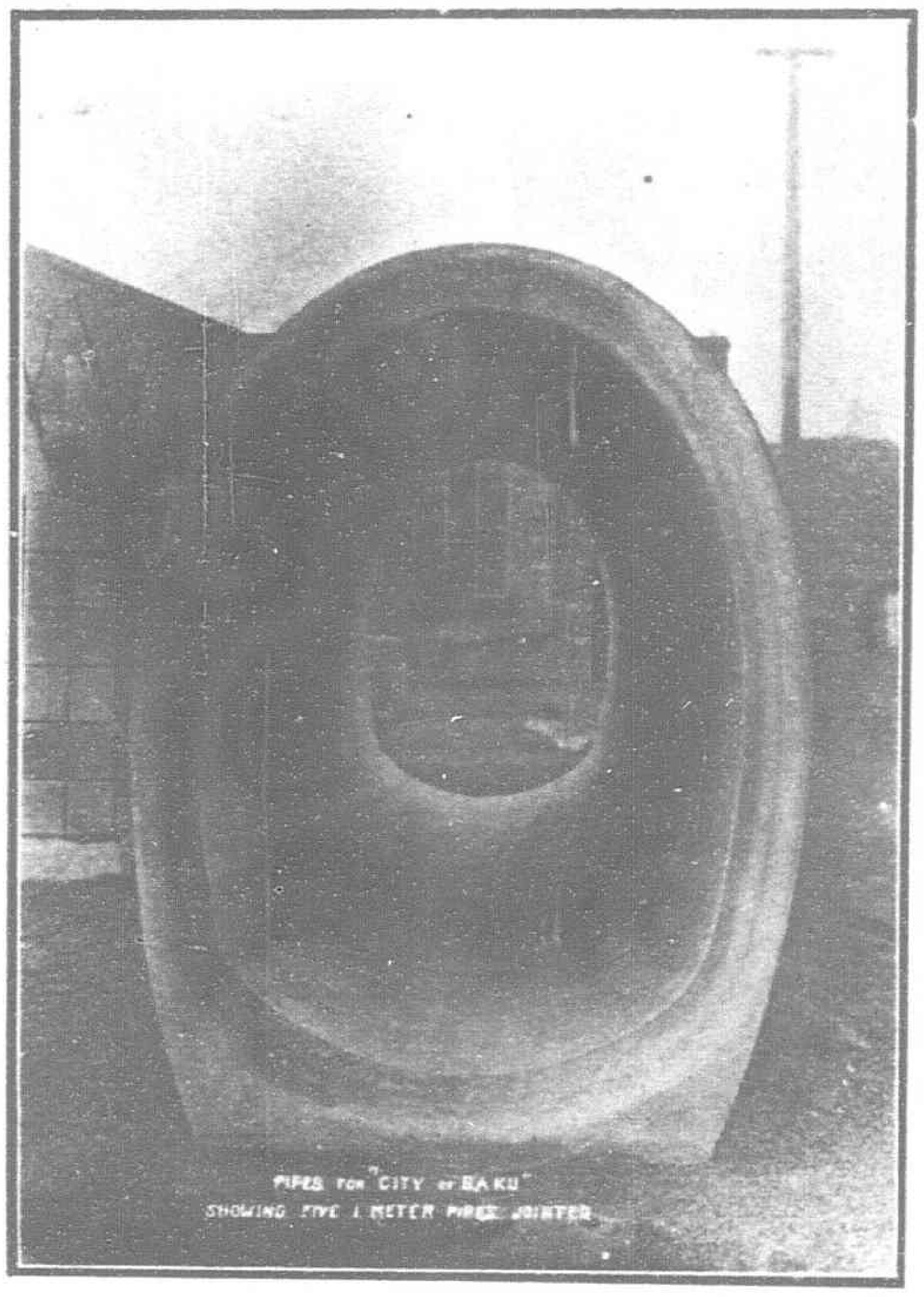


Fig. 15.—

Into this was thrown successive shovelfuls of cement, mortar and large broken flints of very irregular shape—thus there were layers of Concrete supported by these large pieces, the spaces between them being very considerable, and showing very clearly along the sides of the mould. The vibrating table was then set in motion, and it was seen that by degrees all the spaces were filled up with cement without any notable shifting of the large ballast, and after the space of a few moments all the cavities were filled up.

In the foregoing experiment it was further noticed that the cement gradually covered the glass side without any movement of the large ballast,—it having passed between the faces of the mould and the large stones.

After the casting was removed from the mould the surface was found to be covered with a smooth and perfectly adherent coating which gave a very satisfactory appearance showing that by this process it is possible to obtain (without coating or touching up) a fine finish on artificial stones, slabs, pipes, etc.

PLANT.—The special plant necessary for making concrete castings by this process consists essentially of vibrating tables and moulds, with the auxiliary plant consisting of lifts, means of transport of the material, mixing machines and lifting appliances for handling the moulds.

The vibrating table is essentially a rectangular metal frame, with provision for securing the various metal moulds, and connected to a base plate by links.

The machine itself is located below, but with the surface of the table level with, the ground floor, and rails are arranged on the table in continuation of the tramway track of the works, the oscillations and vibrations being transmitted through eccentrics and connecting rods arranged longitudinally under the table.

These connecting rods are joined to the table by springs, and the shocks are made more or less violent according to the initial tension given to these springs.

In cases where large pieces are required to be made, such as telegraph poles or similar structures up to 45 or 50 ft. in length two tables are employed, which the ends of the moulds rest upon, the driving shafts of each table being coupled up together to give a synchronous motion.

One great advantage of this process is that skilled labour is not required, the whole process being extremely simple, and the machines very robust.

This process has been tried and tested by the highest authorities and consulting engineers, and owing to the absolute standardization of pieces by this method there is undoubtedly a great field before it.

At this opportunity it will be impossible to go into great detail, and I propose to describe briefly some of the most interesting articles which are manufactured by this process, together with the special results obtained.

CONCRETE SLEEPERS.—The gradual depletion of forests without commensurate reafforestation, and the consequent rapid exhaustion of the available supply of timber, according to the

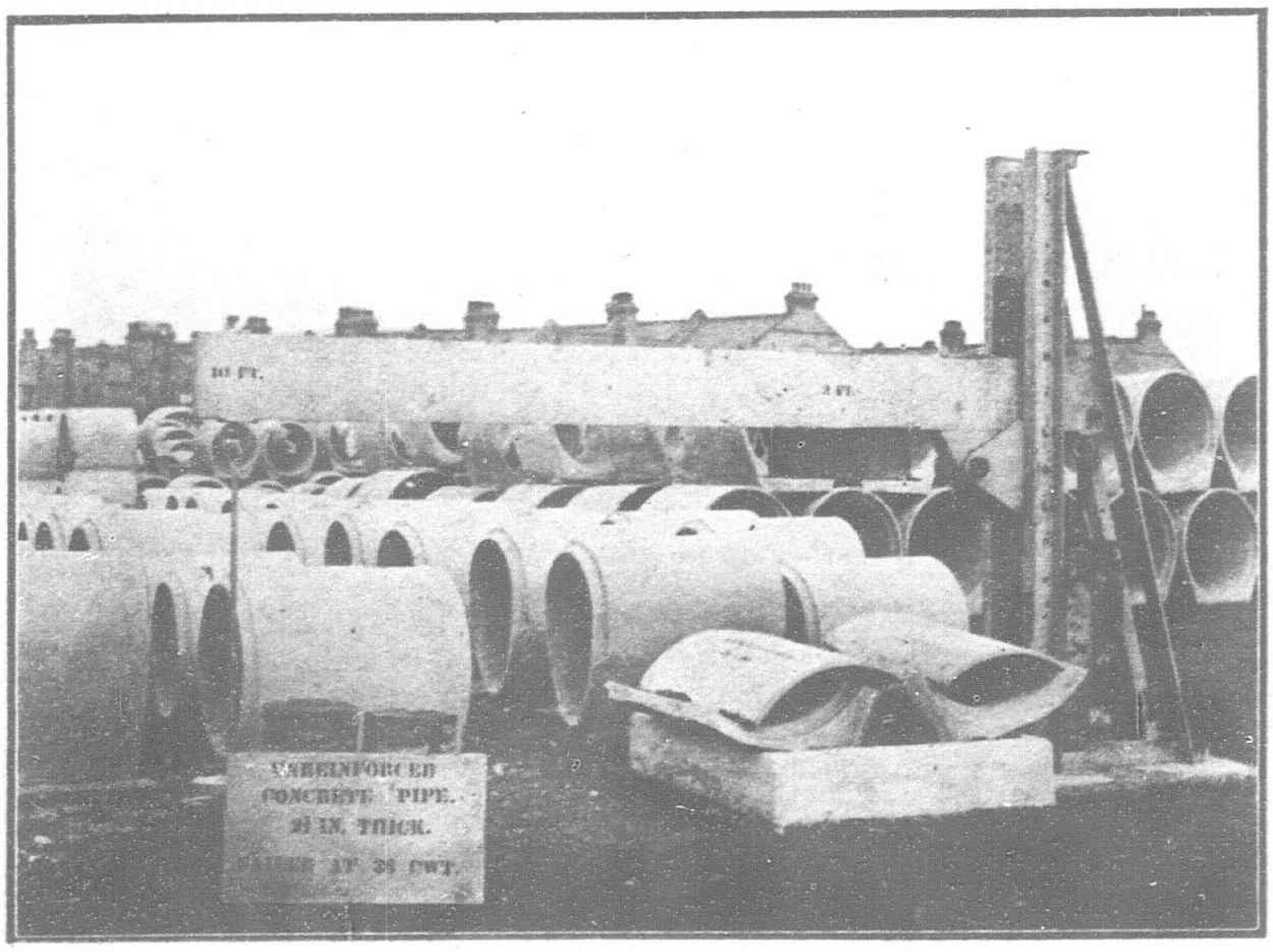


Fig. 10.—

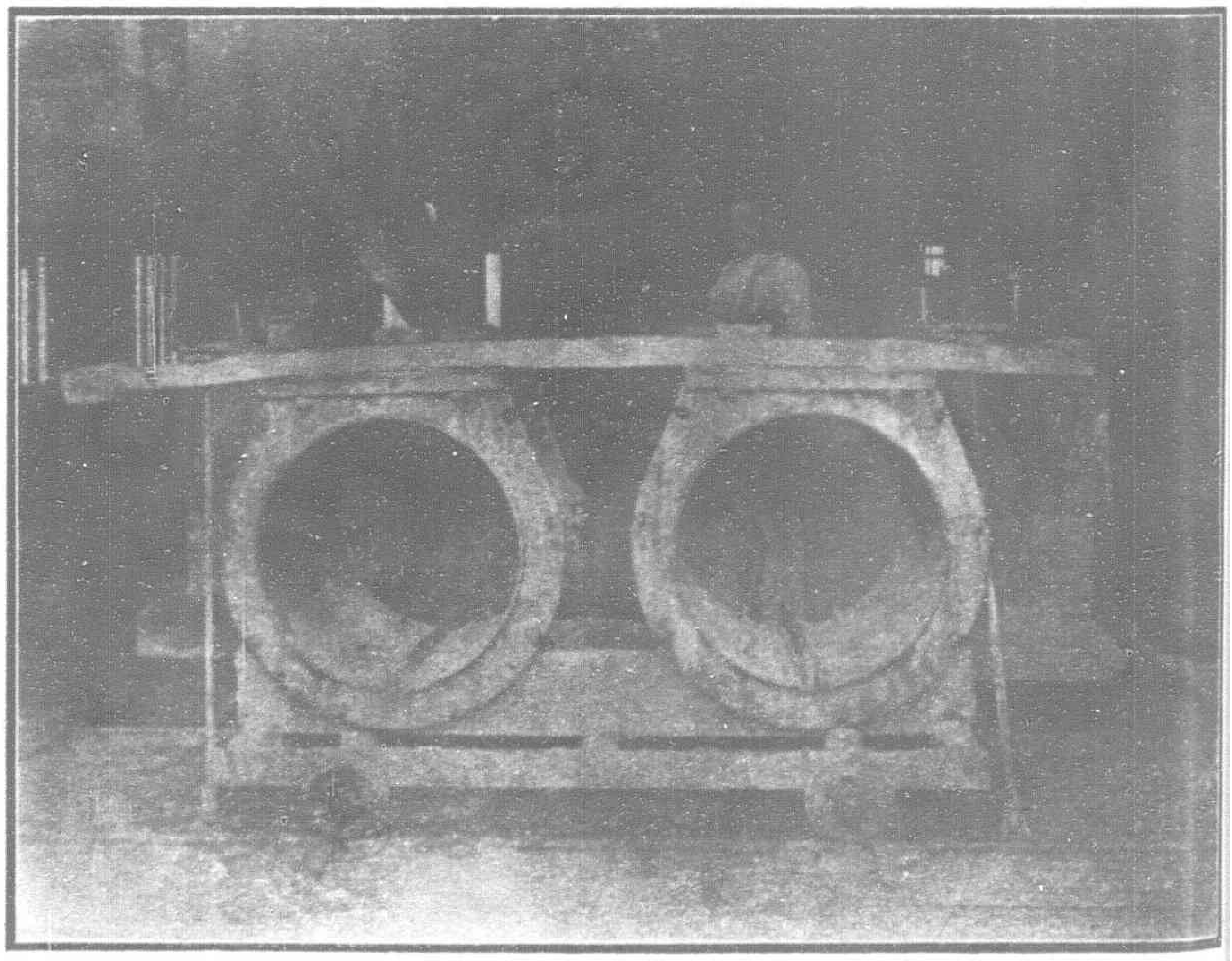


Fig. 11.—

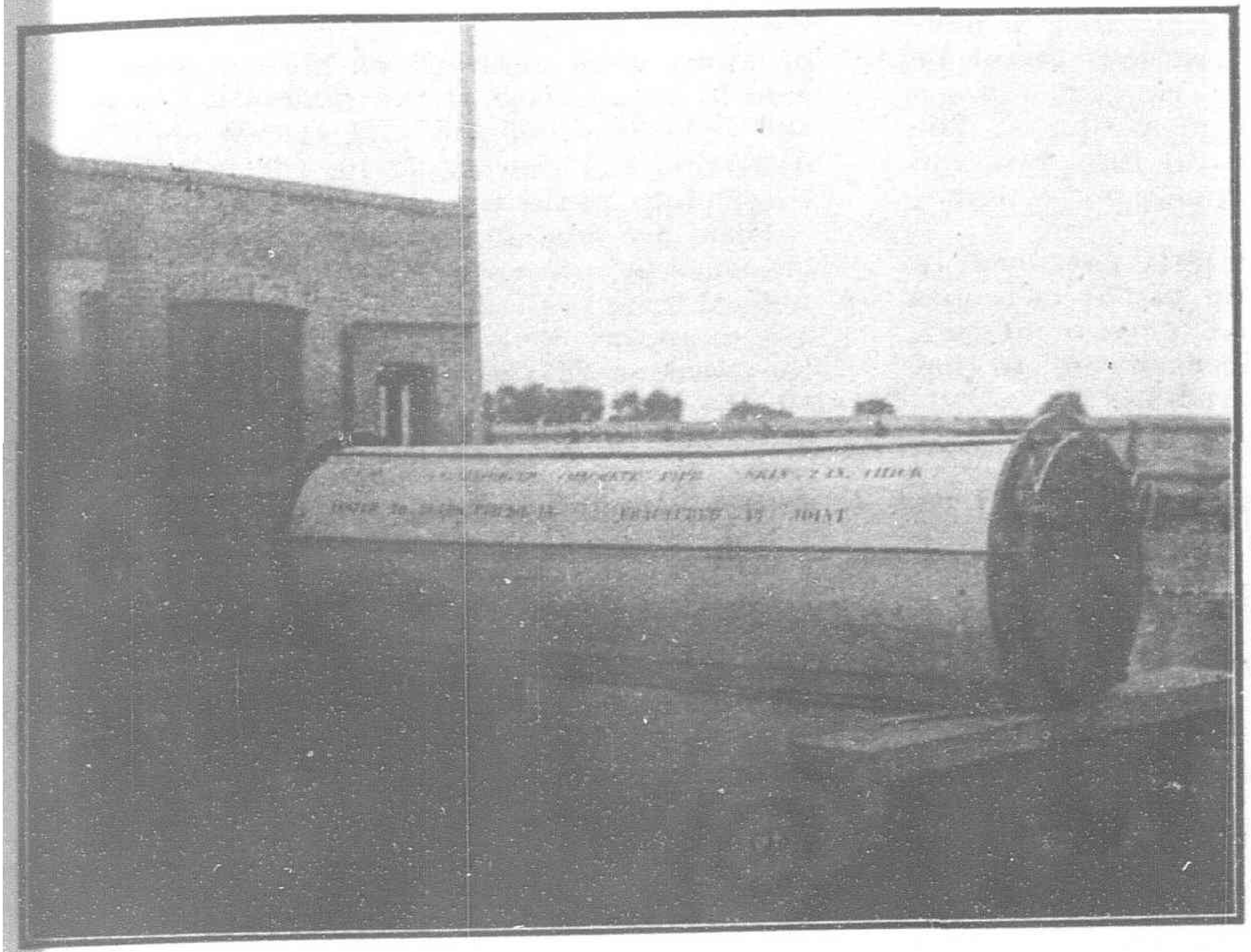


Fig. 12.—

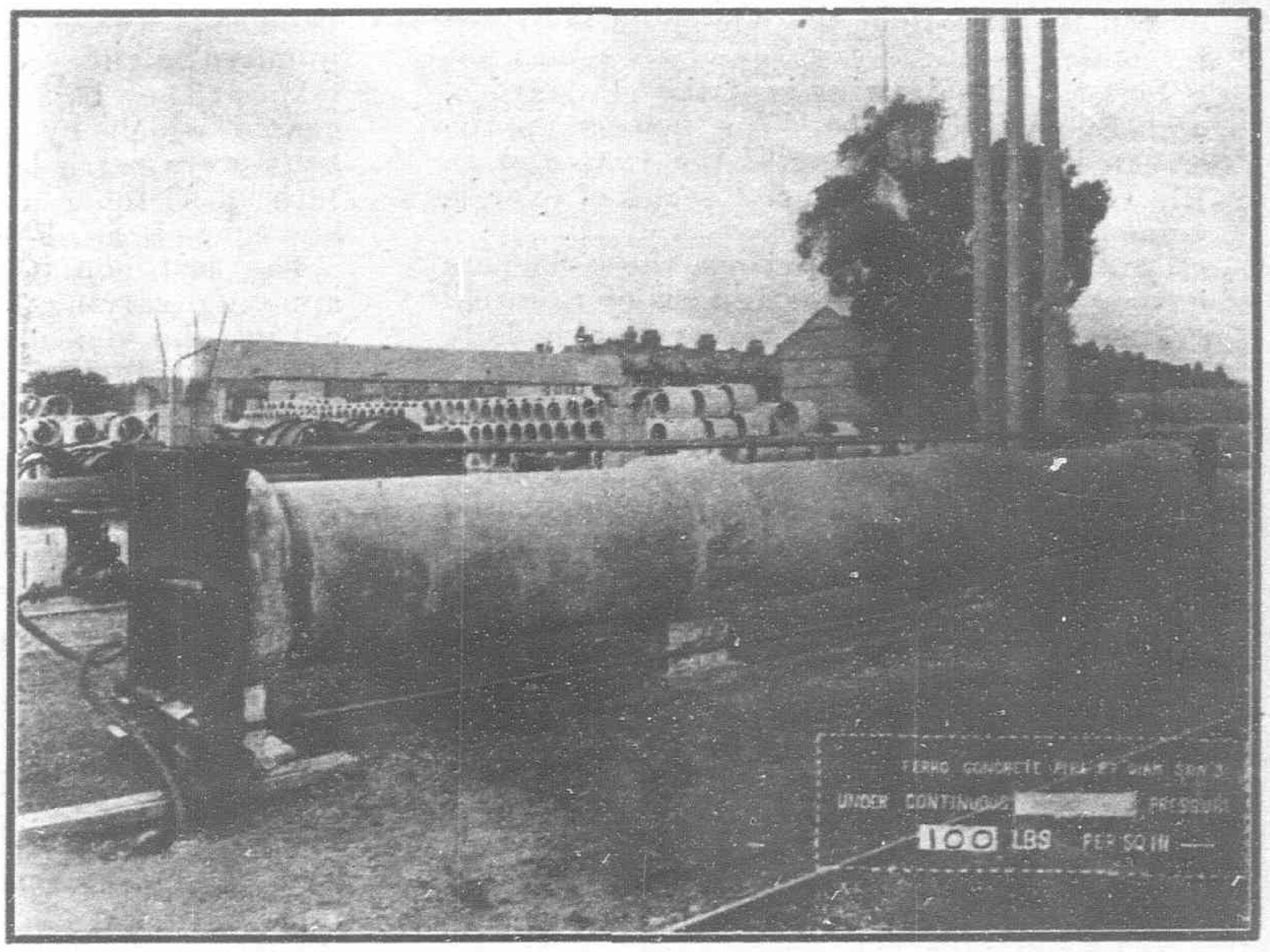


Fig. 13.—

"Journal of Forestry" at steadily increasing prices with deteriorating quality is bound to create an important problem which permanent way engineers of the immediate future must take into consideration.

It is needless to say that in anticipation of this, for some years steel sleepers of various designs have been used in various parts of the United States, Africa, and India, where wood is peculiarly subject to climatic influences, and the ravages of the white ant and the borer. Nor is it necessary to refer to the cost, merits or demerits of steel sleepers, they are already well known to engineers who have used them, and whose opinion on the matter we think should be most valuable. It is therefore particularly interesting to find that these are the very engineers who for years have endeavoured to find a satisfactory substitute, indeed, not for steel but for wooden sleepers. The deduction from this appears to us to be quite obvious. Hence the thought and industry devoted to the realisation of an ideal indestructible ferro-concrete sleeper, which, it is claimed, can now be for the first time manufactured and standardized by the "Jagger" process of oscillation and vibration, with its indisputable advantages.

Hitherto the factors operating against ferro-concrete sleepers have been excessive rigidity, bulk, liability to fracture by shock, hair cracks, cost, impracticability of standardization, and bad system of fastening.

These difficulties have now been overcome by using metal of small cross section, and packing the concrete in perfect sympathy with it by mechanical action, thus eliminating the human—the uncertain—element in the manufacture.

The quantity of steel used in the sleepers ordered by the Italian and British Railways is about 30 lb. and these sleepers are capable of carrying a distributed load of 5,000, and with a deflection of 1 in 1,500 tested as a free beam, and supported 60 in. between supports. They are designed to stand rough wear and severe handling.

The sleepers—Fig. 1.—made on this system have the advantage of being absolutely interchangeable at very low cost, with the holes for the dog-spikes spaced with the utmost precision, and conversely with wooden sleepers, they improve with age, being in fact everlasting and indestructible, possessing the great advantage of being impervious to the chemical action of the soil and the attacks of white ants, and other conditions which are so deletenous to the life of wooden sleepers, and in such countries as China, where wood is so expensive, and where attempts have been made to import teak and other hardwood sleepers, the ferro-concrete sleepers would show a very great saving indeed.

At first some objection was raised by railway engineers owing to the idea that the sleepers would be chipped and broken when the workmen are ballasting the line and tamping under the sleeper. Extensive experience however has proved this not to be the case, and further, the longer they are in service *the stronger and harder they become.*

Fig. 1. We have here actual examples of these sleepers by which you will see that they are arranged to take the ordinary dog-spikes for fixing the rails, or screw bolts and clips can be used; or further, the sleepers can be arranged to take a plate or the ordinary cast iron chair.

The manufacture of these sleepers is a most excellent example of interchangeable concrete work—cast iron moulds are provided, and provision is made for locating the armature or wire reinforcement in its correct position, and dowels or registering pegs provided for locating the exact position of the dog-spike holes so that in any quantity of sleepers made in this mould there is not a variation of $\frac{1}{16}$" between them.

Fig. 2. Shows the actual casting of these sleepers—the concrete is mixed in anupper story and run down an inclined chute direct into the moulds, and this can then be run straight on to the vibrating table, or as is found more advantageous, the chutes are fixed over the vibrating table, and immediately the mould has received the concrete the table is set in motion and in a few minutes the operation is completed.

Fig. 3. Shows the construction of the armature and the arrangement of the *reinforcing.*

In all these castings nothing larger than $\frac{3}{16}$" steel wire with an ultimate tensile stress from 35 to 38 tons per sq. in. is used.

Templates are made for each form of wire, and these are out to length and prepared in considerable quantities, and then assemblied by threading them through the distance pieces as thown in this drawing.

One detail of the reinforcement I would particularly call your attention to, and that is the means by which the bursting force due to the driving in of the dog-spikes is provided for. With this provision the sleepers are relieved of all stress when the dog-spikes are driven home.

This, you will observe from the drawing, consists of a spiral of $\frac{1}{16}$" steel wire, which encirles each hole.

The oak or hard wood tremain or bush of slightly larger diameter than the hole is first

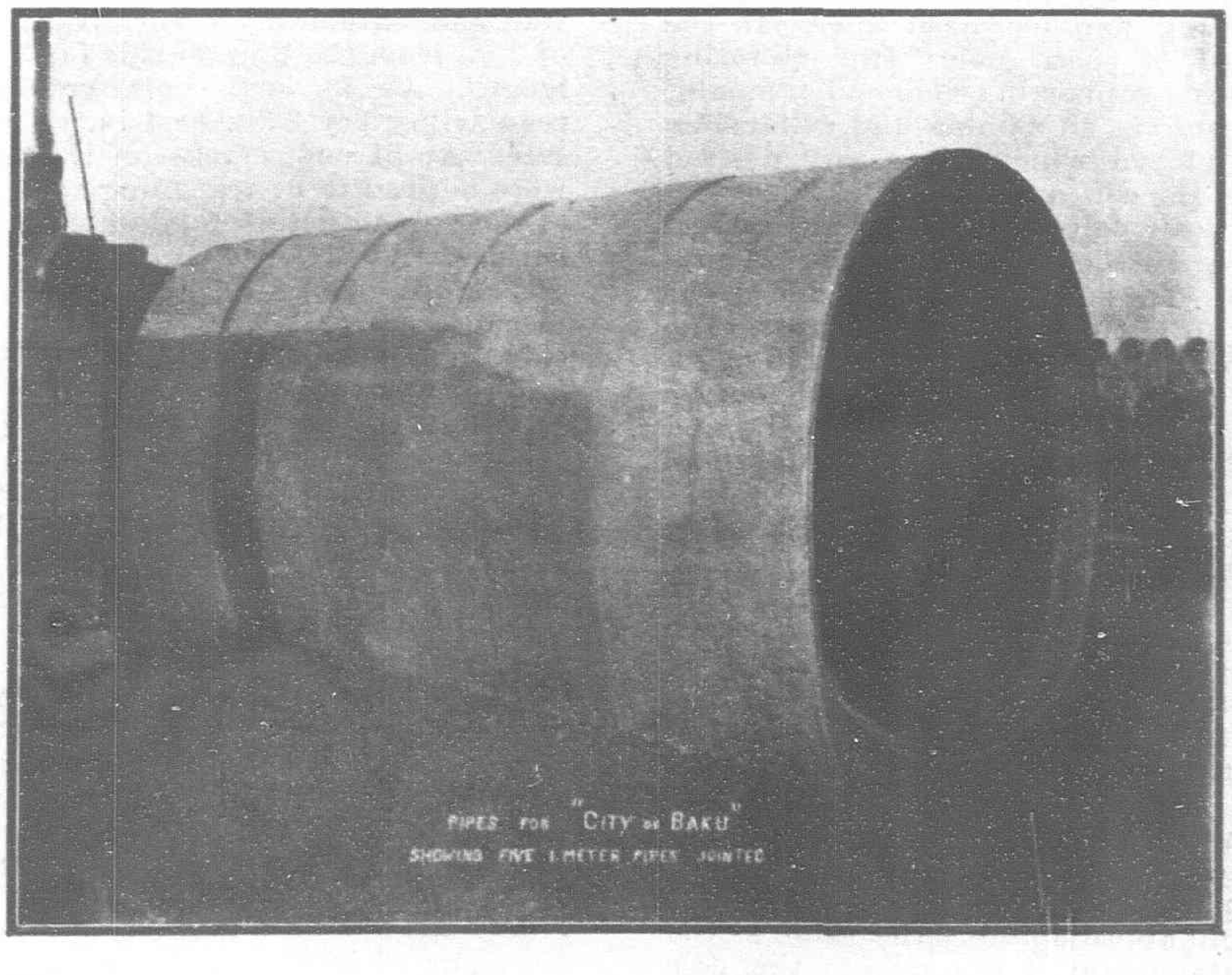


Fig. 14.—

driven in, and then the dog-spike is driven into this bush.

Fig. 4. This drawing is of the standard L. and N. W. Rly. type. The figures on the screen show the sleepers of the L. C. and D. Rly. over which an extensive series of expertment has been made.

Contrary to some criticisms, these sleepers have given much quieter and easier running.

There are four hundred trains running daily over this section of an average speed of forty-seven miles per hour.

At the time these sleepers were laid a new track was made side by side with wooden sleepers, to made a direct comparison of the two systems. In the case of the Concrete sleepers was found impossible to move the dog-spikes once they were driven in, and no "slacking" was reported—with the wooden sleepers however, after a certain period the dog-spikes required adjusting.

It is interesting to notes that, with a compressed oak bush for the dog-spikes a life of twenty years can be relied upon before these require renewing.

On the L. and N. W. Rly. these sleepers carry a 98 lb. rail, and an equivalent heavy axle load.

As an indication of the severity of this service I might mention that the old 10 × 5 wooden sleepers have proved useless under this load, and 12×6 are adopted in their place.

I am informed that these "Jagger" sleepers are now adopted as a standard by the Italian State Railways, where several hundred thousand are in use. They are also in use on the English Main Line Railways, France, Spain, and South Africa.

The weight of each sleeper is 300 lbs., and the cost compares favourable with hard wood. One machine has a capacity of 500 standard gauge sleepers per day of 10 hours.

Ferro Concrete Poles for Overhead Cables.—The use of poles of this system opens up a very large field indeed. For telegraph purposes in the remote districts and situations, such as Mongolia and Thibet they should prove indispensable as in these districts the inspection must be infrequent, and when the wooden poles commence to decay the danger of a break down of the service due to storms is greatly increased.

Fig. 5. Shows a standard 25 ft. pole made on the "Jagger" system. As you will notice, these poles are square in section and cast hollow. These poles are also made in lengths to 60 ft. and are particularly suitable for carrying electric light cables and also for supporting overhead wires on the tramway service.

Fig. 6. Shows three poles which were subject to extensive trials. The one under test is loaded in the same manner as the tramway poles, carrying two overhead lines. In the manufacture of these poles two vibrating tables are used supporting each end of mould, and an ingenious adjustable and collapsible core is employed which gives any desired thickness of the concrete walls.

Some of these poles were tested to destruction last year by the engineers of the General Post Office. These poles were 16 in. at the base and 8 in. at the top, uniform taper. The thickness of the concrete is 2 in. throughout. The poles were 44 ft. 6 in. long and for the purpose of the tests were fixed vertically and firmly embedded in concrete to a depth of 5 ft. 6 in.

The reinforcement consisted of 248 wires 1/16 in. diameter. Fig. 7.

56 of the wires were assembled together in each corner and held in position by distance pieces spaced about 2 in. centres, but no binding wires were employed.

The tests consisted of exerting pulls of varying strength on the pole by means of a wire rope attached to the pole by a clip placed at a point 38 ft. 6 in. above the top of the concrete foundations. This rope was run over the pulley of a crane jib—Fig. 8.—arranged at a height approximately the same as the point of attachment of the rope to the pole and was then taken down to a Salters' balance of 3 tons capacity graduated in half-hundredweights, so that readings might be taken. The balance was connected to a geared winch by means of a chain. The tests were carried out on the 10th, 13th and 16th of October at the Company's works, Stevenage Road, Fulham.

The tests on October 10th consisted in applying varying loads up to 35½ cwt. and noting the deflection and permanent set, the load being released in each case, so that the latter might be measured.

The loads applied were:
3, 5, 10, 12½, 15, 17½, 20, 22½,
25, 27½, 30, and 35½ cwt.

Corresponding deflections were:
¾", 2", 4¼", 5"
6¼", 8", 9", 10½" 12", 14",
14¾", 19½".

Up to a load to 22½ cwt. no permanent set could be observed. A load of 25 cwt. produced a permanent set of ¼": of 27½ cwt., ½": of 30 cwt., ⅜": and of 35½ cwt., ¾".

It is pointed out that to the above weight should be added **1** cwt. for the weight of the spring balance and chain.

On the **13th** October seven separate tests were applied to the pole. In the first five, progressive loads were put on the pole, deflections and permanent set being set out in the following table:

Test	Maximum pull in cwt.	Deflection in inches	Permanent set in inches.
1	31	16½	½
2	35	18¾	⅜
3	40	22	¾
4	45	25½	1⅛
5	50	29	1¾

In the sixth test the load was gradually increased to 57½ cwt. At this point, when the deflection was 34 in., the chain on the drum of the winch broke. The pole flew back, and after vibrating for a short time regained its vertical position, and it was found that no permanent set was shown.

In the seventh test the load was taken up gradually to 60 cwt. The deflection at this point is given as 37½" and the "permanent set" measured immediately after the release of the load was **2** in. After the expiration of an hour and a half, however, it was found that the deflection had become reduced to 11/16 in.

A slight hair crack was observed on the tension side about 5 ft. 6 in. above the foundation when the load was 33½ cwt. When the load was 36 cwt. slight hair cracks appeared at regular intervals of about 6 in. to 9 in. apart. At 41 cwt. a slight shear crack appeared, starting at 33 in. above the foundation and extending vertically at a distance of 2 in. from the tension side for 3 ft. 6 in. in length. At 46 cwt. hair cracks occurred regularly every 3 in. or 4 in. on the tension side. At 51 cwt. cracks on the tension side were noticed to be travelling across the sides of the pole to within 6 in. of the compression surface. At 61 cwt. (60 cwt. plus the weight of balance, &c.), the shear crack was more pronounced, and hair cracks on the tension side occurred about **1** in. apart. No signs of failure were observed on the compression side at this load, and as this was the limit of the gauge on the testing apparatus, the test was discontinued. For this test a more powerful winch and a spring balance of greater capacity were employed than in the tests on the 10th inst. The weights above mentioned must be increased by 1 cwt. for the weight of the balance, &c.

On the 16th October, the pole was tested to destruction. There were two tests. In the first the load was increased, from 20 cwt., when the deflection was 9 in. to 92 cwt., when it was 66 in. The permanent set was found to be 21 in. at this point, and the cracks on the tension side and the shear cracks were more numerous and pronounced. No signs of failure on the compression side were however observed. In the second test the load was again applied, and the first signs of failure were observed on the compression side at the surface of the foundation, when the pole was deflected 73 in. When the deflection had reached 78 in. the pole failed completely on the compression side.

There are several systems for manufacture of concrete poles and doubtless you have noticed those in the French concession. These are, however, weight for weight of concrete, the weakest of the better known systems. On the "Jagger" system it is possible to give an infinitely superior article at the same time cheaper than by any other process containing equal quantities of material.

Not only is it possible to use larger aggregates but a much smaller quantity of cement is needed as the resulting casting is so perfectly homogeneous.

One important advantage in the "Jagger" poles is that they come out of the mould perfectly complete, with all the holes cast in for bolting the cross pieces and also for the climbing irons. Poles carrying lighter loads have a corresponding reduction in the percentage of steel required and small cost for the pole.

Pipes.—In this direction is probably the greatest field of all for interchangeable spigot and faucet pipes made by this process. We are all familiar with the usual hand made concrete sewer pipes and many examples of these can be seen with the spigots rubbed or dropped off, these being repaired by laying on each cement. The result is not altogether satisfactory as pipes made under these conditions are extremely porous and very fragile and far from being interchangeable. On the "Jagger" process these pipes are made with and without reinforcement and the density of the resultant casting is so great that it takes considerable force with a hammer to fracture the spigot; in fact, the elasticity is so great that the hammer rebounds, as off a steel casting.

The point which will appeal to all engineers is that pipes made under this process are absolutely interchangeable and the spigots fit perfectly into the faucet of the corresponding pipe.

Fig. 9. Will show you a group of pipes ready for shipment.

Fig. 10. Shows testing of unreinforced pipes to destruction, the concrete in the example shown being 2-1/4 inches thick, and the pipe failed under 38 cwt.

Fig. 11. Shows the moulds on the vibrating table ready to receive the concrete.

The further important field which is opened up is the possibility of the manufacture of concrete pipes for waterworks.

Fig. 12. Shows an unreinforced concrete pipe tested for 25 lbs. to the sq. in. with a skin 2 in. in thickness.

Concrete high Pressure Pipes.—These pipes are only 3 inches in thickness and have no lining or rendering of any sort and contain only four per cent of steel reinforcement and they stand an internal hydraulic pressure of 10 atmospheres, or say of 150 lbs. to the sq. in. without showing any signs of sweating whatever.

The next best pipe of the kind ever manufactured in the world was manufactured in the United States in the Government Laboratory and was 9 inches thick and contained four or five times as much reinforcement, and yet the internal pressure it would stand was only 40 lbs. to the sq. in.

Now, if you compare the 3 in. concrete pipe made by the "Jagger" process with the 9 in. concrete pipe made by hand, and with machine tamping, you will readily appreciate the enormous difference in favour of the "Jagger" process. In fact, the 3 in. "Jagger" pipe is about five or six times superior as compared with the 9 in. concrete pipes by other systems.

Fig. 13. Will show this pipe under actual tests and the pressure was kept on for many weeks, under a pressure of 100 lbs. per sq. in.

Subsequent pipes have been made for the above mentioned pressure of 150 lbs. per sq. in.

RAILWAYS

(*Continued from page 12*)

China across the track of South Manchuria Railway to the city of Mukden, the work thereon has sufficiently progressed to permit running freight and passenger trains to a temporary station erected about a quarter of a mile from the outer wall, and near the West Gate. The new station is to be known as Shenyang, while the old station of that name is to be given the name of Huangkutun. The traffic movement commenced on January 15.

Two Bean-oil Tank Cars.—Coustructed at the railway workshops, Dalny, were subjected to a trial run with satisfactory results. Each car has 27 tons capacity and is partitioned into four chambers for transporting oil in small consignments.

JAPAN

San in Branch.—The railway line between Hamasaka and Kasumi, in Tajima province, a distance of about eleven miles, and reputed to be the hardest engineering work on the San-in western branch line, was opened to general traffic in March. By the completion of this section, the San-in districts have been brought into closer relations with the Kwansai regions. It means also practically, if not in fact, the opening of the trans-San-in railway, which is projected to cover a total distance of about 230 miles from Kyoto, the starting point. The work was begun in 1900, and has cost up to the present about 30 million yen, from which fact alone it may be inferred what difficult piece of engineering work the line between Hamasaka and Kasumi has proved. The great bridge is 1,017 feet long, and 125 feet in height.

The Toyama-Naoyetsu Line now in course of construction is expected to be opened early in October.

New "Feeder" Railways.—The total mileage of the feeder lines to the main Government railways, which have been building since last year and are expected to be opened to the traffic in the course of the current year, will be nearly 40 miles.

Eig. 14. Shows the pipes laid in the city of Baku water works. This illustration shows five of the pipes, each one metre in length jointed. From this you will judge the beautiful regularity of each of the castings.

Fig. 15. Shows the internal view of the same five pipes joined together, and perhaps illustrates better the interchangeability of pipes made on this system.

I would remark that 110 miles of these concrete pipes were supplied for the Baku Water Works conduit, and established a record contract in concrete castings.

From the foregoing examples you will readily appreciate that no form is too difficult to be made by this process, and for building construction an endless variety of beams and special forms can be made, also paving blocks, fencing posts, artificial stone, and in fact anything where stone or concrete is used.

The following gentlemen joined in the discussion and contributed much valuable information:

A. C. Clear, Esq.	Superintendent and Chief Engineer of Ways and Works Shanghai-Nanking Railway.
T. H. U. Aldridge, Esq.	Electrical Engineer to the Shanghai Municipality.
Professor Robertson.	
C. H. Godfrey, Esq.	Engineer and Surveyor to the Shanghai Municipal Council.

E. Bluce Ball.

April 26th, 1912.

The Maoka line—from Shimodate station, on the Mito line to Maoka, Tochigi prefecture, a distance of 10 miles 31 chains, to be opened to business on April 1st.

The Kurayoshi line—from Kamii (now Kurayoshi on the San-in main line, to Kurayoshi-machi, Tottori prefecture, a distance of two miles 42 chains, to be completed in June this year.

The Kuroishi line—from Kawabe station on the O-U line to Kuroishi-machi, Aomori prefecture, a distance of 4 miles 13 chains to be opened in August this year.

The Iwauchi line—from Ozawa station, on the Hakodate main line, to Iwauchi-machi, Shiribeshi province, a distance of 9 miles 38 chains, to be opened in November this year.

The Wakibetsu line—a distance of 14 miles 13 chains between Nodzukeushi and Rubetsushibe, on the projected line from Nodzukeushi, on the Abashiri line, to Wakibetsu, in Kitami province.

Joso Light-railway Co.—Mr. T. Takeuchi and other Tokyo business men have organized a new joint stock railway company named the Joso Light-Railway Co., with a capital of 1,000,000 yen in 20,000 shares. The line of the company will be constructed between Toride, in Ibaraki prefecture, on the coast line of the North-Eastern State Line, and Shimodate, on the Mito line, the line running through the towns and villages of the old route known as the Mitsukaido, covering a length of 33 miles. The line was chartered in November last year and is to have subsidiary grant of 5 per cent. in accordance with the provisions of the Light-Railway Regulations. Of the total shares, 18,500 have been taken up by the promoters and leading Tokyo business men, including Baron Shibusawa, Messrs. C. Kikuchi, S. Hoshino, S. Kuno, and others. The remainder (1,500 shares) will be offered for public subscription.

I. J. R'ys.—Mr. S. Hirai, vice-president of the Imperial Government Railways of Japan has given the Japan Advertiser the approximate allotment of the 25 or 30 million yen appropriated for railroad improvements by the Government.

About 60 %, or from 15 to 18 millions is to be spent for way works.

Rolling stock will require between 7,400,000 and 7,800,000 yen or 26 per cent.

The Electric Equipment calls for an expenditure of between 2,750,000 to 3,300,000 yen or 11 per cent.

And 3 per cent. will be spent on steamers—or 750,000 to 900,000 yen.

Nagasaki Station.—In April, says the "Nagasaki Press," the long-delayed reconstruction of the Nagasaki railway station is to be begun. The new buildings will be two-storied and foreign style and the cost is estimated at Y150,000. The work will be completed some time in October.

The Mansei Bridge Railway Station.—The Mansei-bashi railway station in Tokyo has been completed, and handed over to the Central Superintendence Office of the Railway Bureau.

The construction of the station cost some two hundred and ninety thousand *yen*, required the work of sixty thousand men and officials, and took over two years to complete.

It was started in August, 1909, under the direction of Mr. Takegoro Okada, and was completed in September, 1911.

The building is two-storied and is constructed after the Renaissance style of architecture from designs by Dr. Tatsuno, beauty and strength constituting its main features. The ground floor consists of waiting rooms for different classes of passengers, cloak rooms, the station master's room, luggage and inquiry offices, and an open hall of one hundred and thirty *tsubo*. The floors of the various rooms are asphalted, whilst the waiting rooms are all provided with marble fire-places. The walls are painted white, and the chairs the same colour as that of the tickets according to the different classes, so that a glance may enable the travellers to distinguish the different classes of waiting-rooms. The upper story is appropriated for a business room and restaurants, Japanese and foreign, consisting of three serving rooms and one bar room.

The dimension of the ground is 451 *tsubo*, measuring 45 *ken* in length, and 15 *ken* in breadth. The principal construction materials are two million bricks, three thousand three hundred poles and pillars, twenty thousand blocks of quartz, one hundred and eighty tons of steel sheets and plates, and three thousand five hundred *kwamme* of copper plates. The building is perfectly fireproof, every room being separated by reinforced concrete, whilst the roof is covered with copper plates set in iron frames.

CHOSEN

The Kang-gyong-Kunsan section of the Konan railway of Chosen has been open to traffic since March, the distance being thirty-two miles. This completes the Korean branch of the Seoul-Fusan railway, which branches off at Tai lyon and runs to Kunsan, a distance of 69 miles.

FORMOSA

Formosa Private Railway.—T. Ando & Co., of Takao, south Formosa, have made application to the Formosan Government for a franchise to construct a private railway in the Prefecture of Ako. Ako is the seat of the sugar industry and is a growing and important industrial center. This will be the first private line in Formosa, except the sugar plantation railways.

An application for a license to construct a 30-mile railway from Hatto to Zuiho (gold-mining district) was presented to the Government office on January 10.

SIBERIA

Amur Line.—It is reported that a single track of rails has been laid on the ice across the Amur River at Khabarofsk and that a provisional railroad has already been constructed about 100 miles inland, paralleling the Amur River. The road is lightly constructed with frozen ground and snow and is being used this winter for provisioning a large supply camp of the Amur Railroad.

Work has already commenced on the tunnels through the Hingan Mountains, and a great amount of activity is seen along the entire line of the future railroad. In the middle of January the Government was purchasing large quantities of wheat and oats in the Amur Province, paying about 5 cents a pood (36.112 pounds) more for it than were any of the flouring mills.

The high cost ($7,725,000) of the bridge to be constructed over the Amur River at Khabarovsk has brought out the idea of building a tunnel under the river in place of the bridge. The bridge in question is to be between 7,350 and 7,560 feet long; and in order not to interfere with navigation, it should be at least 42 feet above high-water mark. The question of a tunnel has been taken under consideration by a special committee in St. Petersburg, which held its first meeting December 9, 1911.

Quicker Transportation.—The Vistula River Railway lines have introduced direct freight connections between Warsaw and Siberia, by means of which the transportation of goods from Russian Poland will be shortened from 16 to 20 days. The line runs from Warsaw to Moscow via Brest, Minsk, and Smolensk.

SIAM

Railway Extension in Siam.—From unofficial sources it is learned that extension of the Northern Siamese State Railway to Chiengmai has been decided upon. The distance from Bangkok to Chiengmai by this route is 470 miles and the proposed extension embraces 140 miles of the distance.

About three years ago it was announced that the Northern Railway would only be extended as far as Sala Meh Puak, and that the Government would take no additional loan for extending this line farther north, and at the same time it was also intimated that a loan of $7,300,000 would probably be required if the line were to be carried on to Chiengmai. The details for the present financial program, however, are still under consideration. It is understood that the cost of this extension will be heavy, as in order to reach the northern capital a low range of mountains has to be crossed or gone through.

The line from the present terminus, Dene Chai, will go via Pang Puei, tapping the Muang Long plain, and, crossing the Rivers Meh Yome and Meh Vang, will emerge on the Chiengmai Plain through a tunnel nearly a mile in length. This extension is important for the development of northern Siam, with its possible resources in agriculture, mining, and forestry.

Further extension of this railway to the northern frontier would suggest connections with possible railway systems of the British-Shan States and southern China.

Royal Siamese Southern Railway.—Eventually to make it possible to travel by train from Bangkok to Penang, the Royal Southern Railway is one of Siam's most interesting present undertakings. Steady progress is being maintained in the work of constructing the line on all sections.

From Singora northward the line has been carried about seventy kilometres, and from Trang the rail-head is some sixty kilometres. Eighty-four kilometres of rails extend from Petchaburi southward towards Tung Sawng, where the Singora and Trang lines will meet. Construction has also been started at Takham, and a start will be made at Chumphon later in the year. Earthworks for the line which will connect Nakawn with the main line have already been put down, and considerable progress has been made with the tunnel on the south side of Tung Sawng, which has been under construction for some months.

The following tenders have been accepted for locomotives and rolling stock for the Southern Line of the Royal State Railways.

Locomotives (tenders for which were opened on 20th January 1912):—

North British Locomotive Co. Ltd., Glasgow, whose tender amounted to £24,595 c. i. f., and £20,900 f. o. b.

Ballast Wagons (tenders for which were opened on 30th January 1912.)—

The Metropolitan Amalgamated Railway Carriage and Wagon Co. Ltd., Birmingham, whose tender amounted to £31,025-12s c. i. f., and £24,122-12s f. o. b.

Covered goods and other wagons (tenders for which were opened on 2nd March, 1912):—

The Brush Electrical Engineering Co., Ltd., Loughborough, whose tender was £9,598 c. i. f., and £7,635 f. o. b.

Siamese Northern Railway.—The construction of the Northern Railway, which has been in abeyance since 1909, has again been taken in hand, says the *Siam Observer*.

Work was started a couple of months ago from the present terminus and the second section is now under construction, while one of the divisional engineers, has left for Meh Pauk, the rail-head, with a large party to take charge of the almost completed first section. The opening of the whole line to Chiengmai will take at least five years as Government finds it impossible to be other than economical in view of the opening of the Southern Line and other public works which require closer attention. The distance from Bangkok to Chiengmai is 666 kilometres out of which 437 kilometres are open to traffic. Although there are only another 229 kilometres to be constructed, this portion of the railway is the most expensive and difficult owing to the hilly nature of the country through which the line has to pass and the difficult tunnelling required. There will be one long tunnel of about a mile in length between Lampon and Chiengmai, besides other shorter tunnels which have not been located yet as the survey of the track is not completed.

Mr. Altmann has been despatched to superintend the work at a point about half way between the present terminus and Pang Buei, surveying the land where it is proposed to construct a tunnel. This is one of the most difficult parts of the country to be traversed by the new line.

Tenders will shortly be invited for the supply of rails and small accessories.

Railway Operations in Siam.—According to a recent report of the Siamses State Railways for the fiscal year ended March 31, 1911, the gross earnings were $1,674,903 United States currency and the working expenses $661,744, leaving net earnings to the amount of $1,012,159, an increase in net earnings of $52,088 as compared with the previous year. Passenger fares yielded 62.41 per cent of the gross earnings, and the receipts for goods and live-stock traffic 36.05 per cent. Of the passengers, 98.54 per cent travelled third class.

Construction was begun on these railways in March, 1889, and at the end of March, 1911, there was a total of about 579 miles open to traffic, at a total cost of $21,784,771, and on that capital cost a net profit of 4.11 per cent was earned last year.

Character and Volume of Traffic.—The total passenger traffic on all the State railways for the fiscal year 1910-11 was 3,155.160, the average fare paid per passenger was 33 cents, and the average distance travelled per passenger 28 miles.

The number of live stock forwarded from the different sections during the year amounted to 137,699 head, against 111,888 for the previous year. The amount of goods carried reached 314,819 tons, an increase as compared with the previous year of 64,348 tons.

Of the total amount of merchandise carried, the bulk went from Bangkok to Paknampoh, Korat, and Utaradit (Tha Sao). During the year 922 tons of corrugated iron, 1,452 tons of cement, 1,140 tons of cloth and clothes, 3,775 tons of salt, 1,161 tons of tobacco, 4,142 tons of kerosene oil, and 1,500 tons of sugar were distributed from Bangkok to the various points on the railway.

Among the products carried to Bangkok were 482 tons of raw cotton, most of which came from places to the north of Paknampoh, the amounts for the two preceding years being 60 and 342 tons, respectively; 68 tons of cardamoms; 1,836 tons of hides and horns, which came from Korat and Paknampoh; 991 tons of sticklac and gum benzion, most of which came from the north; 556 tons of resin; 35 tons of sandalwood and 124,991 tons of paddy.

These statistics are from the report of the Director General of the Siamese State Railways and, although they give a fair idea of the commercial activities of the Kingdom by land, it should be taken into consideration that perhaps the greater part of these activities are carried on through the numerous rivers and canal systems.

Private Railways.—The Packnam Railway runs from Bangkok to Packnam, a fishing village at the mouth of the river Me Nam Chow Paya, a distance of 12 miles. A dividend of 15 per cent on a capital outlay of $222,000 was realized last year. Passenger traffic and transportation of fish to Bangkok are its main sources of revenue.

The Tachin-Meklong Railway extends from Bangkok to fishing villages of the above names on the rivers Tachin and Meklong. Its length is 41.60 miles, and a dividend of 5 per cent was paid on a capital of $825,100.

The Phrabad Railway is 12 miles long, and was built from a village called Tarua on the Northern Railway, 67 miles from Bangkok.

FEDERATED MALAY STATES

F. M. S. Railways.—The Malay States Government Information Office points out that with a view to the further development and opening of the country, the Government of the Federated Malay States is pushing forward the extension of their railway system. The Railway Department will be authorised to expend nearly £600,000 in new construction work this year. By far the biggest job will be the Pahang-Kelantan line, which will eventually join the Siamese system. The Department will also begin the extension of the line from Province Wellesley into Kedah on the north, the deviation of the main line from Kuala Lumpur to Salak South, and the completion of the Kuala Selangor line, while a sum of nearly £80,000 will be spent on a branch line opening up the Rawang coal field, which promises to give a valuable new industry to the Malay States. Seven new locomotives and a large addition to the rolling stock, both passenger and goods, will be made during the year. The survey of the line northwards is not completed, but it is being rapidly pushed forward as far as Semiling, midway to Alor Star, and will be finished in five or six months.

F. M. S. Railways.—The first railway opened in Perak was in 1885, a short length from Port Weld to Taiping, and the first in Selangor was in 1886 connecting the port of Klang with Kuala Lumpur. Since then additions have been made whenever the finances of the States permitted, until at the end of 1910 there were 658 miles of railway open in the Peninsula. The capital account now exceeds six millions sterling and there is a profit on working of 4⅓ per cent.

This magnificent work has been constructed out of surplus revenue without having recourse to any loans, and there is yet much to be done.

In Selangor a line is under construction along the whole of the coast line from the mouth of the Selangor river to Klang.

In Perak a line will, it is hoped, be soon commenced to connect Gopeng with Ipoh. The Pahang line now at Triang is to be continued to the northernmost border of Kelantan and the Federated Malay States Government is, under the Treaty with Siam, bound to lend that Power four millions sterling to connect the Kelantan railway with the existing system at Bangkok. The money is to be paid in fixed annual instalments, and the loan is repayable in, I believe, forty years. The railway is to be built to the satisfaction of British engineers in the employ of the Malay States.

PHILIPPINE ISLANDS

Line to Baguio.—Engineers of the Manila Railroad Company have completed the difficult survey for the new Baguio railroad extension, which will connect the summer capital to the main line of the Manila Dagupan Railroad at Aringay within two more years, and the surveys have been forwarded to the Governor General for approval by Inspecting Engineer William V. Van Blarcom, of the office of the supervising railway expert, who is supervising the project from the Baguio end of the line.

The general plan of the railroad route within the boundaries of the city of Baguio reservation were approved some time ago by Governor General Forbes. A force of about 1,500 Igorot laborers has been working on the grades in Baguio and preparing sites for the freight and passenger depots. The freight depot is to be built on a large cut-out on the hill just opposite that on which the Naguilan trail from San Fernando enters Baguio, near the municipal and provincial building. From the freight depot the line follows the hillside on a level above the Baguio hotel road until the Benguet road is reached beyond its intersection with the Governor Pack road and Military cut-off, where the railroad must cross the Benguet road on a steel trestle, coming in back of the administration building of government center. The passenger depot will be placed there on a site convenient to government center and Sheridan drive, leading to Camp John Hay.

Construction supplies and railroad materials have been sent up over the Benguet road to be in readiness to start work in earnest upon the grades surveyed as soon as the plans are approved. As many laborers as can possibly be handled and kept supplied with material will be hired by the company. This will be one of the chief concerns of the construction foremen.

Feeders for Panay.—Secretary Elliot has alloted P50,000 as Iloilo Province's share in the appropriation for construction work. This money will be devoted to building railroad feeders to connect with the line now running to Capiz, and will reach out and tap several rich sections. It is not certain yet just what sections will benefit by this allotment.

Sumatra Railways.—The Nederlandsche Staatscourant (The Hague) of January 14 and 15 contains a decree providing a supplementary sum of 1,000,000 gulden (about $402,000) for constructing railways in South Sumatra.

Car-wheel Tester.—For one of the Japanese railways a massive up-to-date machine for testing the weight carried upon each wheel of their largest locomotive has been made by W. & T. Avery, of Birmingham. It has a capacity of 360,000 pounds.

Iron and Coal Production In China.—In the course of a recent report the American Cousul-General, George E. Anderson, of Hongkong, writes:—

While it is probable that many of the reports of extraordinarily rich ore deposits and unusually fine coal deposits that have long been a common feature of discussion of China's natural resources and latent commercial and industrial possibilities were greatly exaggerated, enough is known of some of the deposits to warrant the statement that China is well provided with fuel and ore for iron and steel development indefinitely in the future. At present six notable domestic sources of coal are available in China—one in the mining country centring about Chinwantao above Tientsin known as the Kaiping mines; another in the mines in Shantung Province, known as the Hungshan and Fangtse mines; a third in Honan along the Hankow-Peking Railway and operated by the Pekin Syndicate; another in Kiangsi-Honan border country south of Changsha and known as the Pingshiang mines; a fifth in the Chingching mines in Chihli Province; and a sixth in the Japanese mine at Fushun in Manchuria; and various other smaller fields in few of which development upon any modern scale as yet has been attempted. The only modern iron works in China producing iron upon a modern basis and by modern methods—the only works producing pig or steel that may be counted as a part of the available supply of the world—is the Hanyang Iron and Steel Works near Hankow. The president of this establishment has informed this Consulate that 303,076 tops of ore were taken from the Tayueh mines in 1910, and 130,000 tons of pig iron were produced at the Hanyang works, of which 14,034 tons were shipped to Shanghai, &c., 29,167 tons to Japan, and 16,100 tons to the United States. The Chinese exportation of iron ore in 1910 amounted to 196,000 tons. A practically unlimited increase in the production of coal and iron is only a matter of increased demand and increased investment.

ROADS AND BRIDGES

Oil for Roads.—Secretary Charles B. Elliott of the department of the interior, has approved an allotment of P40,000 to the bureau of public works, for the purpose of continuing the experimental work with asphaltic oil and other bituminous binders on the first class roads leading out of the city of Manila. This allotment of funds will enable the bureau to make substantial experiments with the 75,000 gallons of asphaltic oils purchased from funds made available last year in an allotment of P31,600.

Bridges and Roads, P. I.—The following loans have been authorized by the Governor General under the provisions of Act 2883, from the gold standard fund.

To Occidental Negros, for the construction of the Imbang bridge, P15,000.

To Batangas, for the construction of the Sabang bridge, P45,000.

To Batangas, for the construction of the Bauang-Taal road, P50,000.

The sum of P1,600,000 of the P4,500,000 made available for public works in the islands by the gold standard fund has already been loaned. To date 23 provinces have benefited. Nueva Ectia leads off with a budget of P180,000, Ilocos Sur is next with P162,000, Pangasinan third with P144,000 and Ambos Camarines fourth with P100,000. The loans to the first three provinces named will be used in constructing bridges, while Ambos Camarines will use its loan for road and bridge construction.

The Secretary of commerce and police is allotting P500,000 for road and bridge work, distributed on the basis of population, to the thirty-one Christian provinces and the provinces of Mindoro, Palawan and Batanes, from the funds appropriated by Act No. 2052.

From the funds appropriated by Act No. 2059, the secretary of commerce and police has made the following allotments to-day;

P5,000 to the province of Rizal to repair the Taytay-Antipolo road,

P15,000 to the province of La Union for the Naguilian-Ripisuan road;

P25,000 to the province of Nueva Ecija for the Manila-North road;

P25,000 to the province of Pangasinan for the Villasis-Urdaneta-Binalonan road; and

P50,000 to the province of Iloilo to construct roads as feeders to the railway line.

Howrah Bridge, Calcutta.—The Committee of experts, appointed to go through the tenders for the new Howrah Bridge, recommended the design submitted by a German firm. The cost amounts to £555,000. If the contract is given elsewhere, the German firm will receive a prize of £3,000.

Philippine Bridge Fund.—The Acting Governor General has given authority for the loan of P240,000 of the gold standard fund for the construction of bridges in Bulacan province. This fund together with other sums to be allotted from funds already appropriated will provide for bridge construction that will take several years to complete.

INDUSTRIAL PLANTS

Formosa New Printing Company.—By the amalgamation of several printing companies and individual concerns at Taihoku, the capital, a new corporation has been formed, with a capital of $100,000 gold. The new offices will be erected in Butai-gai, Taihoku, Formosa.

Formosa Gas Lighting.—The Taiwan (Formosa) Gas Co. has obtained a 28-year franchise in the city of Tainan, and intends to begin operations about the time the Government commences constructing waterworks in that city. The bill for the waterworks is now before the Imperial Diet. Tainan is the second city in the island and was the capital during the Chinese régime.

Formosa, Sugar Mills.—The Taiwan Seito Kaisha, which has absorbed the Formosa Sugar and Development Co. and the Iki Seito Kaisha, will improve and enlarge the equipment of these new properties. The absorption of the Formosa Sugar & Development Co. removed the last foreign (British) company engaged in the manufacture of sugar. The Taiwan Seito Kaisha is one of the strongest and largest companies in Formosa. It owns six mills, all manufactured in the United States (Honolulu Iron Works).

British Cycle Factory in Japan.—A British cycle manufacturing firm has established at Robe a branch factory equipped with the most modern machinery. This factory was to begin work in January. It will be able to turn out complete bicycles, importing only the steel tubing and the chains and certain accessories such as saddles, bells, and lamps. It is proposed shortly to begin manufacturing bicycle saddles in Japan. The factory is expected to turn out 1,000 to 1,500 bicycles a month with its present plant, which can be enlarged if necessary. Probably three grades of bicycles will be made to suit the requirements of the market. In addition to complete bicycles, bicycle parts for sale to assemblers throughout the country will be produced, and also jinrikisha wheels, for which a good demand is anticipated.

Yokohama Industrial Enterprise.—The municipal authorities are continuing a very active campaign to secure the establishment of manufacturing plants at Yokohama. Electric railway facilities are being extended and suitable tracts of land are being offered under inviting terms. Reductions in taxes are also offered as inducements, application therefore being made through the mayor of Yokohama.

In the industrial district of Yokohama a wood-pipe plant and electric wireworks have recently been established, and a rope-manufacturing industry and a lead-pipe factory will shortly be constructed. The Standard Paint & Composition Co., an American industry, is numbered among Yokohama's new industrial establishments.

In addition to exemption from taxes for a number of years, water and gas are to be supplied to Yokohama industries at specially reduced rates.

Machinery for Formosa.—The Formosan Government has made two important contracts with American firms.

The first contracts is for the purchase of a steam sawmill costing $150,000 gold placed through the Mitsui Bussan Kaisha on behalf of Allis-Chalmers, of Milwaukee, Wis.

The second contract is for a long-handling apparatus costing $25,000, from the Lidgerwood Manufacturing Co., of New York, placed through Takata & Co.

The contract for the purchase of four steam boilers costing $15,000 will go to the Babcock-Wilcox Co. (Ltd.), of Glasgow.

The manchinery is expected to arrive in May and will be used in the exploitation of the Mount Arisan forest districts. The work is to cover five years.

Flour Mill.—A new flour mill is to be erected in Khabarovsk. The proprietors are Isaieff Bros., millers in Vladivostok, and A. I. Arhipoff, of Khabarovsk.

Banana Canning Process.—A Japanese confectioner in Tainan, South Formosa, claims to have discovered a process by which the banana may be canned. He has interested several wealthy Japanese, and a $100,000 company has been organized to build two factories, in Taihoku and in Tainan. As canned or conserved bananas have been very unsatisfactory, the new process in Formosa will be watched with much interest.

Textile Plant at Malabon.—A new Filipino manufacturing concern, which operates under the name of L. R. Aguinaldo and Company, will soon have running 25 hemp braiding machines, an electric power loom and a fishing net machine, in addition to abaca hand looms now in use at the factory in Malabon.

The two machines at present in operation at Malabon each turn out daily three pieces of braid 79 meters long, five mm. wide and one-half mm. thick. These braids, which are used for hats, are of 13 strands each, and the strands are alternately of two and three fibers. One operator can manipulate four such machines at one time.

The present output of the factory is shipped to Austria where it is used for hats.

Button Factory.—Orders were placed in America and Europe for large quantities of button making machinery for La Cencha Button Factory. The purchases include machines of the latest type and will largely increase the output of the factory. The company's plant is to be enlarged and will be ready for the installation of the machinery on its arrival.

Additional capital has been invested in the corporation, which for several years has enjoyed a growing business, and the money is being expended in betterments to meet the expanding trade.

PACO ICE COMPANY.—Articles of incorporation have been obtained by the Paco Ice and Cold Storage Company of Manila. The capital stock is P21,000 and the company is authorized to conduct a general ice plant and cold storage business, deal in distilled water, produce, meats, poultry, butter, vegetables, fish, fruits, and live stock, and to manufacture rattan and bejuco products.

Francis Connor is treasurer of the Company, the capital stock of which is divided into 21 shares of the value of P1,000 each, fully subscribed and paid up. The shareholders are Alicia Connor P7,000; Frederick Hollin P6,000; Francis Connor, P6,000; Thomas L. Hartigan, P1,000; Phil C. Whitaker, P1,000.

CEBU GARAGE.—Articles of incorporation have been filed by the Parian Garage Company of Cebu, the incorporators being Dr. N. T. Deen, Eduardo de Roda, Jose Gomez, Toma Alonso, and Fred P. Warren.

The capital stock of the new company is P20,000 divided into 800 shares at a par value of P25 each.

PROPOSED TEXTILE WORKS.—A textile factory for the manufacture of cloths from native fibers is a promising industry that may be developed in the near future by Italian capital.

The field has been investigated by Signor Oddino Morgari, an Italian capitalist and member of the Italian chamber of deputies, *who has spent several months in the Philippines* studying the various kinds and grades of fiber produced here, with a view to establishing in Manila a textile factory for the manufacture of cloths from native fibers.

SAN ANTONIO CENTRAL SUGAR MILL.—The new sugar central owned by Messers. Urquijo Escubi and Zuluaga on their large estate seven miles east of La Carlota Negros P. I. was inaugurated, in March.

The mill is composed of six rollers; the first is a crusher, with Diamond rolls. Through the Diamond crusher the cane passes through the mill. The bagasse is conveyed from the last set of rollers and dumped directly into the furnace. After being extracted the juice runs into pipes that conduct it into the heaters. From the heaters the juice is pumped into the four 500 gallon clarifying tanks, and after being limed and defficated is let down into *six clarifying tanks of 600 gallons each.* From here the clear liquid is run through the triple effect, evaporators, and then discharged into the vacuum pan supply tanks, and then the juice, which is now a pure syrup, is rum into the vacuum pan to a crystalized point, and then let into the mixer, and from there on to the centrifugals as required. After this it is bagged for shipment, a finished product, 98 per cent pure. The strike is discharged from the vacuum pan direct to tanks; and after about a week is drawn out into the centrifugals.

One strike of the vacuum pan is five tons of sugar, and three strikes can be made in twenty two hours, ensuring an output of 240 piculs in a run of twenty two hours.

In July, 1911, the engineering from of Messrs. Strachan & MacMurray of Iloilo sent the order to Glassgow for this mill. With such a limited time at their disposal, the contractors had the central built, equiped, and ready for grinding by March first.

The estate on which this central is located consists of about one thousand hectares, or twenty-five hundred acres.

Thi sis the second mill to be inaugurated in Negros. The first was installed on the estate of Senor E. de la Rama, at Talisay, and this mill is also doing good work and coming up to *the expectations of its owners.*

THE MANILA GAS FRANCHISE.—Manila's municipal board has granted the Schweizerische Gasgesellschaft of Zurich, Switzerland, permission to construct its gas plant on the Gonzales property, north of the extension of Calle Isaac Peral, in Paco. In the treasury of the insular government there is a deposit of P50,000, a guarantee by the company that the obligations of its franchise shall have been fulfilled within 23 months from December last. The company paid P125,000 for the franchise.

The resolution of the municipal board granting the authority company to build its plant follows:

"Whereas: *the gas franchise to the Schweizerische* Gasgesellschaft provides, under Section 11 of said franchise, that the grantee shall begin the construction of its plant in the city of Manila within nine months from the date of the granting of permission to construct by the municipal authorities; and

"Whereas, Section 12 recites as a fact that the said Schweizerische Gasgesellschaft has deposited with the Insular Treasurer the sum of P175,000 for the payment for said franchise and as security for its faithful performance of all the conditions of said franchise and of all obligations imposed upon it; therefore.

"Be it resolved by the Municipal Board of the city of Manila, that the Schweizerische *Gasgesellschaft be, and it hereby is, granted* permission to construct its plant in the city of Manila under terms and conditions set forth in its franchise."

Work is to begin by July 1, and it is believed that the plant will be completed by the end of the present year.

The estimated cost of the plant complete with tanks and storage is P4,000,000.

The gas plant will be erected in Paco district, close to the Pasig river and almost directly opposite the San Miguel brewery. This site, which comprises an area of 90,059 square meters, was purchased some months ago from Harold M. Pitt by Judge W. A. Kincaid, attorney for the Schweizer Gasgesellschaft, the syndicate which obtained the gas franchise and contracted with Mr. Grossmann for the construction of the plant. The price paid for the site was P90,059, or one peso a meter.

The contract includes the construction of seven buildings, one gas tank and two subterranean tar tanks, and the laying of from 70,000 to 80,000 meters of gas pipe. Most of the buildings will probably be constructed of reinforced concrete. The furnace structure will be of sheet iron, and,

The seven buildings to be constructed are: a furnace structure, an apparatus house, a building to include store house and repair shop, a structure to serve as coal bunkers where the gas-producing coal for the furnaces will be stored, a meter house, an office building which will also serve as residence for the chief gasfitter and other white employees, and a residence for the general manager.

The gas tank will have a capacity of 7000 cubic meters. The two subterranean tanks will be used for the collection of tar which is derived from the gas furnaces and which will be sold in the local market.

YUNNAN'S INDUSTRIES.—The latest "port," or, inland mart, to be opened by the Chinese Government to foreign residence and trade is Yunnanfu, the capital of Yunnan. It is not a "treaty port," but was voluntarily opened by the Government following the completion of the French Yunnan Railway, which connects Yunnanfu, via the important mining district of Mengtsz, with the Tonkin border at Hokow-Laokai. The city stands in the center of an elevated plain over 6,000 feet above the sea and of unusual fertility and salubriousness for southern China, and has a population of 85,000. It already possesses a mint, an arsenal, an electric-light plant operated by hydraulic power, a flour mill, a tannery handling 1,000 hides a month and turning out shoes, saddlery, accoutrements, etc., for the new army, a provincial assembly hall built in foreign style, new law courts, new prison buildings, etc., and has other innovations under way. Several foreign firms have located in the city and many of the native merchants have erected new and more pretentious shops—all looking for the business which is confidently expected to follow at an early date. (C. R.)

IRON DRUMS AS RECEPTACLES FOR BEAN OIL.—Iron drums as receptacles for bean oil for oversea export are found to be too unwieldy and also encounter a customs duty in Japan, in case *of not being reexported within a fortnight of* their importation. They are dutiable at 1.95 yen (yen=$0.498) per 100 kin (kin=1.323 pounds). A Yokohama firm dealing in fish oils used old drums experimentally, but although satisfied of their being proof against leakage, could not use them, owing to the sudden advance of steamer freight, from England to Japan, from $1.20 per 40 cubic feet last year to $2.40 this year, and to the other disadvantages named. This Yokohama firm, which exports large quantities of fish and other oils, is trying to solve the problem of receptacles by planning a cask which meets all requirements. With kerosene-oil cans, which are most commonly used for bean oil, there is a leakage of 3 or 4 *per cent.*

The iron drum suggested as a substitute by Japanese Commercial Commissioner Tawara, at London, is U-shaped and manufactured by the Steel Barrel Co., London, being quoted in the catalogue at about $11 each. It is 41½ inches high, 36⅛ inches in diameter, and weighs 230 pounds; 4 drums hold 3 tons. The iron plate of which it is made is about ⅛ inch thick.

The new bean-oil mill of Kiosensha & Co. (Japanese), at Old Harbin, has been completed, inspected, and passed by the technical and sanitary committee of the Chinese Eastern Railway, and will soon be in operation.

NEW INDUSTRIES IN INDO-CHINA.—New industries are being established on an increasing scale. Three large cotton factories have been started and are reported a great success on the whole—one at Haiphong with 25,000 spindles, one at Nam Dinh with 24,000 spindles, and one at Hanoi with 10,000 spindles. The three factories produced somewhat over 351 metric tons of cotton yarn from native cotton during last year.

In Hanoi there is a large ice factory, a match factory, a large paper-making establishment about to be put in operation, several distilleries, a brewery, furniture factories, and similar establishments. The great cement establishment at Haiphong is already one of *the notable factors in export trade.* During the past 10 years the cities have been laid out upon a modern plan, great waterworks establishments have been installed, the cities are lighted by electricity, the larger ones are equipped with tramways, telephone, and similar conveniences and even a subsidized opera season in theaters of more than ordinary quality is a feature of the life of the people.

SIBERIA.—A new modern sawmill is to be erected by Mr. Kusin at Station Iman on the Ussuri Railroad, for which he has received a grant of 2.7 acres of land from the railroad.

A wax and oil factory is about to be established at Station Ussuri on the Ussuri Railroad, eastern *Siberia, for which the railroad* will grant an acre to Mr. Bliakin, the proprietor.

NEW AUTOMOBILE CO., JAPAN.—Messrs. K. Nezu, T. Mayekawa, E. Sugihara, K. Okazaki, S. Okuda, T. Kadono, and other business men of Tokyo and Nagoya have organized a company for the manufacture of automobiles and bicycles. The company will be a joint-stock establishment with a capital of 2,000,000 yen, and is called the Automobile and Cycle Company. The promoters have secured the support of Messrs. B. Nakano, S. Satake, S. Ohashi, and other influential business-men.

New Sugar Centrals, P. I.—A Correspondent from Bacolod has informed the Cablenews that it is now an assured fact that there will be established a sugar central at La Carlota, Negros Occidental. Eleven planters, including four of Yuchausti and Company's planters, have signed contracts with E. Sendres of the Philippines Bank (Banco Español Filipino) to furnish their cane to grind if the central is established sufficiently large to turn out one hundred or more tons of sugar daily. The agreement, it is understood, is to allow forty-five percent, to the mill and fifty percent, to planters. The bank will administer the central mill and will deduct eight percent, interest on the investment. Sugar centrals are being installed or arranged for all over Negros and the planters will, as a result, soon be getting a far greater percentage of sugar from their cane than from the old, antiquated mills, besides turning out a better grade of sugar, receiving therefore, of course, a better price than formerly. After the bank is repaid for the investment, the central mill is to go to the planters.

New Steel Company.—Baron Shibusawa, Messrs. Kihachiro Okura, Motojiro Shiraishi, and others are organizing a steel company with the object of manufacturing steel ingots and steel tubes. The company will be styled the Nippon Kokan Kaisha (Japan Steel Tube Manufacturing Co.) and have a capital of 2,000,000 yen, three-fourths of which will be taken up by the promoters.

Soya Bean Mill, Sweden.—The U.S. Consul Stuart J. Fuller, of Gothenburg, states that for installing a plant to work soya beans from Manchuria, the Aktiebolaget Goteborgs Risoch Valskvarn (Gothenburg Rice and Roller Mill Company) has increased its capital stock from 794,000 crowns ($212,792) to a minimum of 2,000,000 crowns ($536,000) and a maximum of 6,000,000 crowns ($1,608,000). The establishment of such a plant at Gothenburg has been discussed for several years. The plant will be the first of its kind in Sweden.

The new enterprise is allied to the Swedish and Danish East. Asiatic companies, and with similar plants at Copenhagen and Stettin, and Danish money forms part of the capital. The two East Asiatic companies referred to operate a joint steamship service to the Far East, and the problem of return cargo for the ships that go out with paper, pulp, timber, and iron is important. This explains their interest in developing uses for Manchurian beans. It is planned to expend 1,500,000 crowns ($402,000) in a plant capable of handling 30,000 tons of beans annually, and so designed that it can easily be enlarged to 50,000 tons capacity.

New Weaving Factory:—The Mitsui Bussan Kaisha has decided to inaugurate a weaving factory to be named the Asahi Boshoku Kaisha, for the production of grey-shirting and other cotton cloths, with a capital of 5 million yen. The promoters met on the 31st ult. when it was decided to place about one-fifth of the shares on the market in the middle of this month. About yen 3,500,000 of the capital is to be sunk in machines, etc. And if there is a prospect for successful issue of debentures only one half of the capital is to be paid in for subscription. A majority of the shares is to be taken up by the Mitsui family and other parties concerned. The factory has for its object supplying the products to Manchurian and Indian markets.

Chosen Cotton Co.—The Chosen Cotton Company mooted originally by the influential members of the now defunct Il Chinhoi of Korea is reported to be in a fair way to successful consummation, it having been decided to increase the capital to two million yen divided into 40,000 shares. The supporters of the scheme mainly consist of Chosen peers. The promoters met quite recently when the organizing committee was elected with Count Song Pyongshan for chairman, and 30,000 shares have been allotted to the promoters and supporters of the scheme. The general public will be invited shortly to subscribe for the remaining 10,000 shares.

Japan Paint Company.—The formation of the Japan Paint Company for the purpose of manufacture and sale of a paint invented by Inspector-General of Naval Construction Harada which was recently patented by the Patents Bureau is said to be nearing its consummation.

The capital is fixed at yen 2,000,000. Amongst the promoters are Baron Goto, Baron Takei, Messrs. Ikeda, Matsukata Ono. Otaguro and several other prominent names in business circles. The promoters are to meet on the 20th instant to consider the matter of the allotment of the shares and other necessary measures relating to the organization of the corporation.

Bamboo Pulp.—The Mitsu Bishi firm has for a few years past been making experiments on the manufacture of bamboo pulp which having proved successful, the firm has quite recently established in Formosa a factory for the manufacture of bamboo pulp, which was opened to business from this month. The factory is now capable of producing about 25,000 tons of pulp a month but the firm purposes to bring the production up to 50,000 tons in the near future. It is stated that the cost of production of bamboo pulp being greater than the price of imported pulp, it would not pay to use it for manufacture for foreign paper. Besides it is more suitable for manufacture of Japanese paper. The firm has despatched an expert to the paper mills to explain the use of the pulp for the manufacture of Japanese paper. While on the subject we note that discovery has been made in Karafuto of the paper material popularly known as ozundra. Mr. Arakawa has succeeded in discovering the process of bleaching the material, for which he has secured letters patent. A small factory will be established for further experiment.

ELECTRIC LIGHT AND POWER PLANTS

Electric Light and Water-works at Swatow.—During 1909 and 1910 a new electric-light plant was erected, the work being in charge of Arnold, Karberg & Co. The machinery consists of 4 Young's Lancashire boilers, 2 Babcock and Wilcox water-tube boilers, 2 Worthington feed and fire pumps, 1 Cameron (New York) surface condenser, 4 Bells and Morcam (Manchester, England) self-lubricating engines, and 4 direct-current generators with switchboard (Allegemeine Elektricitats-Gesellschaft, Berlin). The city is wired with mains feeding sub-mains through section boxes. Consumers are supplied with 220 volts, and the number of lamps installed at the beginning of 1910 was about 4,000. All streets are lighted by 25-candle power lamps at intervals of about 80ft. The price to consumers is fixed at c.30 Mexican on the first 1½ units and c.20 on each succeeding unit per lamp per month.

The Hongkong Electric Co., Ltd.—Paid a dividend of 14 per cent. for the year ending 29th February, 1912.

Shanghai Charges for Electricity.—The following revision of the Scale of Charges for Electricity has been authorized with effect from April 1, 1912:—

Lighting—Consumers have the option of payment under either of two tariffs:—

Flat rate of Tls. 0.10 per unit with discount of

5%	for a consumption over	1,000	units per month
7½	,,	1,500	,, ,,
10	,,	2,000	,, ,,
15	,,	3,000	,, ,,
20	,,	4,000	,, ,,
25	,,	5,000	,, ,,
30	,,	6,000	,, ,,

Pagsipi Hydro-Electric Franchise.—The Philippine Government has passed an act authorizing the granting of a franchise for the use of the waters of the Pagsipi River for the purpose of operating a hydro-electric plant to supply the town of Lucban with light, heat and power. Tenders for the franchise have been published.

Baguio Hydro-Electric Project.—To provide electric current to meet the needs of Baguio and furnish power for a large new light plant, ice plant, and pumping station, the municipal board of the summer capital proposes to harness all of the water power available. The city is considering two sources of, either of which or both may enter into the project.

One of the projects is located on the Irisan river, where a fall of considerable volume can be utilized. This fall, however, is at a considerable distance from Baguio and for that reason the main plant may be placed on the Bued river, where the stream forms a considerable fall just below Camp Seven. Sufficient power to supply Baguio with electric current for all purposes it is estimated can be easily secured from either of the proposed sites.

G. E. Plants for Japan.—Among its recent foreign indents the General Electric Company, Schenectady, N. Y., has secured orders for four 1,000 kw. two-unit two-bearing frequency changer sets and one 75 kw. two-unit three-bearing direct current generator set for the Tokio Railway Co., Japan; also thirty-three 50 kw. transformers, one 50 kw. testing transformer, four induction regulators, five small motor generator sets and two £00 kw. voltage exciters for the Katsuragawa Hydro-Electric Power Co., Japan.

Liaoyang Electric Light Co.—The opening celebration of the Liaoyang Electric Light Co. was held on May 12th. Mr. Sun made a congratulatory speech and Lieut.-Gen. Ohtani proposed the prosperity of this enterprise maintained under Sino-Japanese Management.

Peking Tramway.—Peking, May 19. The financial arrangements for the proposed Peking tramway have apparently been completed. A sum of Tls. 6,000,000 has been subscribed by Japanese and Tls. 2,000,000 by Chinese. The balance, which may be still necessary, will be raised later on by shares to be offered to the public.—"*Ostasiatischer Lloyd.*"

Bangkok Power Station Tenders.—Tenders for the Power Station at Samsen were opened at the offices of the Minister of Local Government on March 15th, ulto.

The plant included boilers and superheaters, turbo-generators and condensers and pipe work, switchboard, storage battery, travelling crane, and paddy husk elevators and conveyers.

Some firms tendered only for part of the plant required, which is indicated in the appended list by the words "tender not complete." B 1 indicates turbo generators, condensers, and pipe work, B 2 turbo generators, condensers, and alternative type of pipe work.

C. A. Parsons and Co., tender not complete.
Riley Hargreaves Ltd.,
  B 1 £71,370; B 2 £75,280
Foster Engineering Co., tender not complete.
Brush Electrical Engineering Co.,
  B 1 £70,361; overhead lines, £14,004;
    Power Station building, £74,753.
Babcock and Wilcox (agent Howarth Erskine, Ltd.) tender not complete.
Brown, Boveri and Co., tender not complete.
Frazer and Chalmers and Siemens Bros.,
  B 1 £70,540, B 2 £69,508;
    Power Station building, £13,250.
Dick, Kerr & Co. (agents, East Asiatic Co.),
  B 1 £63,917.
General Electrical Co. (agents East Asiatic Co.), tender not complete.

A. E. G., British Thompson Houston and General Electrical Co., U. S. A.,
B 1, £54, 154.
Overhead lines, schedule prices.
General Electrical Co., London (agents, Bangkok Dock Co.)
B 1 £76,900.
Power Station building £43,844.
Brush Electrical Co. (agents, Howarth Erskine Ltd.,)
B 1 £72,681.
Power Station building, £76,891.
Williams and Robinson and Siemens (agents, Howarth Erskine Ltd.),
B 1 £75,240.
Power station building, £76,973.
Bellis and Morcom and Siemens (agents, Howarth Erskine Ltd.)
B 1 £75,128.
Power station building, £76,973.

The combined tender of the three firms A. E. G. (Allgemeine Elektricitats Gesellschaft, Germany), (Chief Contractors), B. T. H. (British Thomson Houston Coy., England), and G. E. C. General Electric Coy., America), has been accepted.

The figure of Tcs. 54,154 included the erection of husk conveyors and elevators. The A. E. G. will instal the turbo-generators with condensers. There will be three of these with a total capacity of three thousand kilowatts, three phase, 50 cycles, 3,500 volts. The turbines are to be of the Curtis horizontal type, directly connected to the generators and running at 3000 r. p. m. The B. T. H. Co. will supply the switch gear, and the General Electric Co. the transformers. Eight Babcock and Wilcox boilers, each with a heating surface of 4,000 square feet, and able to burn husk, oil or coal, will be used.

The current at the power station will be utilised for the pumping station of the water supply, at the Opium farm, and for the various palaces at Dusit Park.

The work of installation will be carried out by the principal contractors, the A. E. G.

Mr. J. E. Burgess of the firm of Arnhold, Karberg & Co., representing the A. E. G., went from Shanghai specially in connection with this particular tender, and will remain on for some time to settle the details prior to the commencement of the work. The station has to be ready within 18 months from the date of the signing of the contract. The tender accepted amounts to £54,154 and this is for the provision of turbo generators, condensers and pipe work. The price given for the overhead lines was according to schedule.

Malacca Electric Light Plant.—A local company has obtained a thirty years licence from the Malacca Municipality to operate an electric light plant, The contract having been let to Messrs. Riley Hargreaves and Company for $49,485. The generating plant will be driven by two horizontal suction gas engines, arrangements being made to allow for extensions to this plant without alteration of the buildings. Mr. P. M. Robinson has been retained as chief engineer. The capital of the Company consists of $15,000 in 15,000 shares. There have been issued 6,600 shares and 5,000 will be held in reserve, 1,600 are issued to the contractors as part payment of contract, and 1,800 have been issued to the promoters or their nominees in full payment of fees and expenses connected with the promotion of the Company.

Siam Electricity Co.—An important addition to the power station has been made in two new A. E. G. turbines, installed in connection with the three phase system. Turbines of the same model, although of slightly less power, are to be employed in the Government station shortly to be built.

Harbin.—The municipal administration of Harbin contemplates offering a prize for the best suggestion and detailed project for the construction of electric tramways in Harbin. The details will soon be worked out, and copies of the specifications will be supplied to all who desire to either participate in the contest.

Electric Enterprises in Western Japan.—The *Jiji Shimpo* publishes an interesting account by Dr. Asano, Chief of the Electric Experimental Bureau in the Communications Departments, of electric enterprises in Western Japan, where he has been on a tour of inspection.

Electric enterprises in the western districts, viewed as a whole, he thinks, have made remarkable development in several respects. We can still remember the time when we looked with wonder at dynamos of a thousand kilowatts installed by the Tokyo Electric Railway Company. Now they are too common, electromotors capable of generating ore thousand or even one thousand five hundred kilowatts of electricity being found almost everywhere throughout the country. So far as Osaka is considered, four generators of five thousand kilowatts are to be installed before long, besides the five dynamos each generating some three thousand kilowatts which the city already possesses. Under these circumstances, it is not too much to say that Japan compares very favourably in this respect with the different Powers of the world, excepting such senior countries in this line of industry as Germany and the United States. In view of the marked progress our country has attained in so short a period, we my safely rest assured of the still brighter future lying in store for our electric enterprises.

What specially attracted my attention was the gas engine of six hundred horse power installed in the Hasa mines in Kyushu. In such quarters as these, where the coal supply supply can be obtained at a very moderate cost, this sort of machine may be used with great advantage for various industrial purposes. The perfect conditions of the water-power electric enterprises in Saga, Fukuoka, Hiroshima, Kyoto and other districts are also worth mentioning. As is well known, our country possesses a rich supply of water-power, and this fact not only convines us of the necessity of encouraging water power electric enterprises, but at the same time inspires us with confidence that such undertakings will prove an unqualified success. Thus far, only high tension currents have been utilized for motor purposes, but there is a tendency gradually obtaining towards the utilization of lower currents. In this context it may be noted that generally speaking, what claims our first and foremost attention in starting water power electric enterprises is the relative conditions of the coal supply and electric undertakings. In those districts, for instance, where coal is cheap, it may pay to start water power electric enterprises even at a comparatively high cost, but in those quarters where coal is high priced, it would never pay to start such enterprises unless the supply of water power be at the cheapest possible rate.

As regards electric railway undertakings, they show very satisfactory results in every part of the country. Viewed from the standpoint of provision and accommodation, it may be generally stated that those which were first constructed are for the most part, poorly provided, while those laid down recently are all up to date. Of late, electric railway enterprisers in this country have undertaken dealings in land as auxiliary work. This sort of enterprise has long been undertaken in Western countries, but in Japan, somehow, no one has thought of such an attempt. As scarcely needs stating, these dealings in land, when undertaken as a secondary work of the electric railway enterprise, can certainly be calculated, in case of an appreciation of the price of land, to make good such losses as the railway business may sometime suffer, and thus to facilitate in no small measure the development of the primary enterprises.

Passing on to electric lighting enterprise, it is marked in every quarter with such thriving prosperity that the supply never equals the demand. In such cities as Osaka the demand for electric lamps by the citizens in general increases by almost a thousand a month. The electromotors are, in most cases, on the steam turbine system, while the steam engines are equipped with mechanical coal suppliers. The merits of the coal supplier lies in a saving of the consumption of coal by some twenty per cent. and also in preventing the production of soot.

By no means less progress is being made in the production of electric apparatus. As the Japanese are a people distinguished for handicraft, and as their scientific knowledge is by this time tolerably developed, this is an industry well worth encouragement.

Hydro-Electric Dividends.—A general meeting of the shareholders of the Uji River Hydro-Electric company was held on the 24th instant when it was decided to declare a 5 per cent. dividend and also to issue yen 3,500,000 worth of debentures to fill the deficit in the fund for the prosecution of the work. The proceeds of the debenture are to be appropriated to the construction of distributing sections in Osaka, etc., and also to make good the deficit calculated to amount to some yen 800,000 after the company's capital of yen 12,500,000 has been all laid out for the completion of the work. The company has no immedate need of funds but has decided to issue yen 3,000,000 work very shortly through the Kitahama and four other leading banks in Osaka, reserving yen 500,000 worth for a future issue. The issuing value of the debentures is put at 98, the unredeemed period being three years, after which the debentures are redeemable in seven years. The debentures carry 6½ per cent interest.

The firm of C. G. Young, Engineering—Construction—60 Wall Street, New York, have been engaged to make an examination and report for a proposed Electric Railway System in Central America, due to Mr. Young's very extended experience in the electric railway field not only in this country but in Central and South America and many other foreign countries. One of the firm's engineers has sailed to make a study of the local conditions.

WIRELESS, TELEGRAPHS, TELEPHONES

Imperial Wireless Scheme.—Announcement is made by the directors of Marconi's Wireless Telegraph Company (Ltd.), of the acceptance from his Majesty's Postmaster-General of the Company's terms for the construction of all the long-distance wireless stations which will be required within the next few years for the Imperial wireless scheme, and which will be erected for the purpose of conducting a commercial telegraph service.

The Company will proceed with the construction of the following stations forthwith: England, Cyprus or Egypt, Aden, Bangalore (India), South Africa, Singapore. It is anticipated that others will follow in the immediate future.

The Terms.—The stations will be operated by the Company for account of the Government for the first six months, and thereafter by the Government. The Company will receive a payment of £60,000 for each station, exclusive of site, foundations for machinery and buildings, and the buildings themselves, which, if so required, will be constructed by the Company at cost price for account of the Governments. The terms further provide that the Company shall receive 10 per cent. of the gross receipts of all the long-distance stations so erected for the term of the agreement, which is twenty-eight years from the date of the opening to service of the first three stations. The Government will have power to end the agreement at the expiration of eighteen years, but in that event they would cease to have the right of use of any of the Company's patented processes or machinery.

Wireless Stations in India.—The Pioneer says that steady progress has been made with the formation of wireless stations in India. In the financial year 1910-11 the sum Rs. 49,000 was spent in starting work at Calcutta, Allahabad, Delhi and Jutogh (Simla). In 1911-12 this work has been continued, and a beginning has also been made at Bombay, Karachi, Nagpur and Lahore. The expenditure has been Rs. 6,000,000 for 1912-15. The provision is only two lakhs. There will later on be a heavy outlay on account of payment to the Marconi Company. The equipment of each of the eight stations with the necessary apparatus has been provided for, and India should soon have an inland radio system, while the stations at the ports of Calcutta, Bombay and Karachi will be powerful enough to communicate with ships at sea at very long distances.

P. I. Wireless System.—The immediate establishment of 14 wireless station, eight of them high power, and the ultimate installation of over 100 smaller stations, perfecting a continuous chain of aerial communication between the islands of the Philippine group, connecting all populated Islands not now touched by cables, and making communication between the principal cities of the islands independent of cables, is the purpose of a bill which has been introduced in Congress. The bill embodies the principal features of the exhaustive report submitted by the Wireless Board appointed by President Taft, which consisted, at the time of its report, of Secretary of Commerce and Police Charles B. Elliott, Lieutenant Colonel William A. Glassford, of the Signal Corps, and Commander Charles M. Fahs, commander of the Olongapo and Cavite naval stations.

Trans-Pacific Wireless.—According to an article in a recent issue of the Army and Navy Journal, the bureau of steam engineering of the navy department is contemplating the establishment of a string of wireless stations across the Pacific, with a terminal station situated on the northern coast of the island of Luzon.

Engineers of the department have made a careful study of the strategic and ordinary advantages of such a system, which they say will keep the department in constant touch with the fleet in Pacific waters without having to rely on the commercial cable service.

As yet no plans of a definite nature have been announced, but it is expected that the plan will be adopted if Congress can be persuaded to appropriate the funds necessary to carry out the scheme, approximately $2,000,000.

Siberian Wireless.—In order to maintain the connections between the western and eastern parts of Russia, on the one hand, and the western part of Russia and western Siberia, Russia has determined to establish wireless stations somewhere near the Kara Sea, at Nava Arhangelsk(?) and the island of Waigatz. For this purpose the Russian Government has asked the Duma for the disbursement of a million rubles. Russia intends by this measure to maintain communications with western Siberia by making steamers go to the mouth of the river Obi and then up that stream, when the Kara Sea is free of ice and the waters become navigable. This route of communication was recognized as profitable and practicable at the time of the Russo-Japanese war. Since then investigations have been going on, as a result of which it has been ascertained that, in order to learn of the time of the thaw, there is no better means than wireless telegraphy.

New Japanese Cables.—The Japanese Department of Communications has completed the laying of a special single cable between Fusan and Shimonoseki. A new cable has also been laid between Tokyo and Nagasaki, which will be opened in May.

The island of Sakito, in Nagasaki has been connected by cable with Kakiura island on the Kyushu coast.

Great Northern Telegraph Company.—The 28th of next December will witness the expiration of the Great Northern Telegraph Company's charter of the Shanghai-Nagasaki and the Vladivostok Nagasaki cables. It is thought that the Japanese Government will seize that opportunity to buy up the Company, or, at any rate, to amend the terms of its charter. At present, messages in the Japanese language cannot be transmitted across the wires.

Telegraphic Communication between Imperial Harbour and De Castries is to be established, according to the Priamursky Vedomosti. The only stations of importance on the Russian shore of the Japanese Sea and the Tartar Straits at present are De Castries and St. Olga. In 1911 the line was completed up to Sizimi Bay, a distance of 57 miles. The length of the entire line will be about 220 miles. Another line is to be constructed from Cape Pogibi to the village of Ribnoe, on Sakhalin Island.

Changchun—Telephone service has been established between Changchun and Harbin, with the main office at Kwangchengtzu. The Japanese post-office, has communicated with the Russian authorities for the extension of the line to Changchun, and connection between Russian and Japanese territories is expected to be established shortly.

Telephones in Manchuria.—There are 13 telephone exchanges in Manchuria, located in the following cities: Dairen, population 41,809; Liushutan, population 4,622; Tashihchiao, 2,320; Fushun, 5,083; Tiehling, 38,108; Port Arthur, 18,142; Kinchou, 10,751; Liaoyang, 66,869; Mukden, 165,634; Kungchuling, 3,833; Changchun, 38,262 Hsin-minfu, 41,918; Antunghsien, 7,855. The total mileage of telephone wire in the cities is 6,031 miles, and interurbar 2,317 miles.

The service is conducted by the State, except the private lines of the South Manchuria Railway Co., which are operated for its own use. The Yingkou (Newchwang) Hydraulic Electric Co. supplies telephone service for the public at Yingkou.

Siberia.—*Army telephones.*—During 1911 the troops of the Priamur military district used portable field telephones of a new pattern, manufactured by Siemens & Halske. The new telephones are carried in a knapsack, and the coils of wire are carried in the same manner. The third battery of the sixth artillery brigade used the new telephones during the fire practice from November 2 to 4, and they give an excellent report regarding them.

Telegraph lines are to be constructed in the north of Asiatic Russia. The budget provides $154,500 for a line along the seacoast from Okhotsk to Petropavlosk, Kamchatka, and $103,000 for a line from Petropavlosk to Ust-Kamchatka. This will also enable the Imperial Bank and the Russian Treasury to make telegraphic remittances to Petropavlosk. Wireless stations will be established at Okhotsk, Tiguil, and Ore.

A telephone system will be installed in Nikolaiefsk on the Amur during 1912.

PUBLIC WORKS

Harbin—A report has been prepared for the Harbin town council in regard to the estimated $100,000 deficit in the town budget for 1912 and to provide funds for various municipal improvements. The report concludes that it will be necessary for the municipality to float a long-term loan of about $1,000,000. Should the loan be floated, it is proposed to expend the money as follows: Repairing hospital, building barracks, and completely equipping same, $30,000; construction fire department headquarters, $47,500; construction municipal administration headquarters, $50,000; construction two school buildings, $37,500; construction market place, New Town, $100,000; park, New Town, $15,000; concrete cisterns for street drainage, $55,000; construction electric tramway, $500,000; total, $835,000. Cost of floating loan and balance on hand, $165,000.

Indo-China.—The draft of a law authorizing the Governor General of Indo-China to contract a loan of 90,000,000 francs ($17,370,000), in order to carry out various works of public utility and interest, stipulates that this sum is to be apportioned as follow: Completion of the works commenced under the loan authorized by the law of December 25, 1898, $5,018,000; irrigation works, $3,686,300; construction of roads. $2,123,000; construction of railroads (Dong-Dong to Na-Cham, Vinh to Quang-Tri Mytho to Cantho), $4,496,900; establishment of schools, $289,500; installation of hospitals, infirmaries, medical laboratories, dispensaries, etc., $289,500; installation of wireless-telegraph stations, $115,800; survey of railroads, roads, ports, works of irrigation and of navigation $772,000; miscellaneous and the expenses of negotiating the loan, $579,000.

The necessary annuity to assure the interest and amortization of the loan will compulsorily be entered in the general budget of Indo-China, the payment of it being guaranteed by the Government of the French Republic.

Chosen.—The budget of Chosen (Korea) for the fiscal year ending March 31, 1913, estimates a total revenue of $26,116,220, an increase over the preceding year of $1,957,446. The principal increases from ordinary revenue are: Customs, $208,055; ginseng and salt, $204,007; posts, telegraphs, and telephones, $216,857; railways, $711,090, respective increases.

Under the head of customs an allowance of $224,100 has been made to cover the proposed abolition of export duties on rice, marine produce, and "other commodities" after April 1, 1912.

The total contemplated expenditures amount to $26,116,220. The amounts of increase in expenditures appear under the following heads: Government monopolies, $76,694; provincial administration, $135,498; communications, $155,120; railways, $716,857; interest on loans, $325,626; encouragement of industry, $76,530; land investigation, $310,290; subsidies, $271,965; maritime customs, $74,129; Seoul waterworks, $88,563.

Decreases in expenditure of $239,568, through administrative readjustment, and of $229,080 for repairs of roads are proposed.

[The London and China Telegraph states that: "The proceeds of the increased revenue are to be appropriated to the encouragement of the salt business and the improvement of harbours, waterworks, railways, and agricultural land, the protection of forests, industrial products, investigation, cotton cultivation, establishment of public schools, subsidies for coasting services and other public and industrial enterprises."]

Manchuria.—The Japanese Government of the Kwantung leased territory is striving to develop various industries, for which $125,000 is devoted. With the object of making Dalny not only the first-rate trading port in Manchuria, but also a port of transhipment for Korean ports, as well as Tientsin and other North China ports, an annual subsidy of $35,000 has been granted to certain local shipping firms engaged in coasting trade. The four steamers receiving such subsidy will soon be increased to five or six.

An annual grant of $5,000 is made to the Fishery Association and the Marine Products

Co. (Ltd.). A special subsidy may also be granted for the export of marine products to South China.

To open a market for Kwantung salt in Korea a $10,000 subsidy was granted. The Government is working hard to promote the sale of salt.

Willow planting is being encouraged. Wicker trunks are now popular, being used both by Chinese and foreigners, so there is good prospect for the manufacture of willow articles. The Government is also distributing free seeds and fruit trees to both native and Japanese farmers. Grape culture is promising, and a subsidy of $5,000 for wine making has been allowed.

Glass factories have started at Dalny and Port Arther. A subsidy is given the industry, which appears promising.

Straits Settlements.—Information has been received that the plans for the new Singapore sewer system are nearing completion and that the project will probably be thrown open to bids by May, 1912.

Loans for Provincial Works, P. I.—Baguio, March 26.—More than a million and a half pesos of the P. 4,500,000 made available for public works in the islands by the gold standard fund has already been loaned. The full list of loans made is given below:

Date on which made	Province	Municipality	Amount	Purpose
1912				
Feb. 5,	Bulacan		P. 36,000	Bridges
,, 6,	Pangasinan		144,000	,,
Mar. 7,	Nueva Ecija		180,000	,,
,, 11,	Occ. Negros		7,500	,,
,, 18,	Ilocos Sur		162,000	,,
,, 11,	Batangas		50,000	Roads
,, 14,	,,		25,000	Bridges
Feb. 28,	La Union		70,000	R. & B. and repmnt of loans
Mar. 8,	Amb Camarines		100,000	R. & B.
Feb. 13,	Capiz		18,000	P. Bldg.
,, 13,	,,		67,500	Bridges
Mar. 6,	Bohol		90,000	,,
,, 11,	Occ. Negros		78,000	,,
,, 5,	Leyte		54,000	,,
,, 18,	Antique		50,000	,,
Feb. 26,	Tarlac		50,000	Roads
Mar. 5,	Samar		68,000	Comp. P. B. & J. B. incl'g.
,, 1,	Iloilo		35,000	Surv. of lands
,, 5,	,,		68,000	B. & C.
,, 11.	Rizal	Caloocan	12,500	Mkt. & Water System
Feb. 27.	Pampanga		37,500	Bridges
Mar. 5,	Sorsogon		80,000	,,
Feb. 29.	City of Baguio		60,000	Pur & Imp. E. L. Plant
Mar. 4.	City of Manila		25,000	Street widening
,, 9,	Nueva Ecija		15,000	Roads
,, 18,	Or. Negros		24.000	Bridges
			P. 1,607,000	

P. I. Public Works Bonds.—The Committee on Insular Affairs has approved the application for a new issue of bonds for public improvements in the Philippine Islands to the extent of P. 10,000,000 providing the money is not used by the Commission exclusively, without the consent of the Legislature, and provided it is not used for purposes of public improvements in the non-Christian *provinces.*

Construction of Buildings—For the construction of permanent buildings, namely Provincial Prison at San Ramon Farm, twenty-five thousand pesos; storehouse at Zamboanga, ten thousand pesos; district building at Jolo, twenty thousand pesos; district building at Davao, ten thousand pesos; district building at Cotabato, *two thousand pesos; district* jail at Dansalan, two thousand seven hundred fifty pesos; building for use as an intermediate and high school at Zamboanga, thirty thousand pesos.

Construction of Roads, Bridges and Trails.—For the construction of roads, bridges and trails, namely, Mati-Boston road, fifteen thousand pesos; Davao-Santa Cruz road, forty-five thousand pesos; miscellaneous small bridges, twenty-five thousand pesos; Hijo-Compostela *trail, ten thousand pesos;* Tamontaka-Estero bridge, twenty thousand pesos; Marahui-Camp Vicars trail, ten thousand pesos.

Construction of Telephone Lines.—For the construction of telephone lines, namely, Dapitan-Baliangao line, three thousand pesos.

Construction of Docks and Wharves.—For the construction of docks and wharves, namely, old wharf at Zamboanga, sixteen thousand pesos.

Purchase of Equipment.—For the purchase of equipment, namely, general equipment, twelve thousand five hundred pesos; road and bridge *equipment, thirty thousand pesos.*

Nagasaki.—The Municipal Budget for the ensuing fiscal year is as follows: Ordinary expenditure, Yen 665,651; Waterworks expenditure. Yen 152,642; Harbour reclamation works—Expenditure Yen 197,872, income Yen 324,247. Of the ordinary expenditure, Yen 56,153 is for the municipal office, Yen 23,683 for public works, Yen 120,136 for education, and Yen 40,224 for sanitation.

Moro Province Public Works.—The Legislative Council of the Moro Province has appropriated the sum of P. 387,850 to be expended on public works.

SANITATION WORKS IN JAPAN

Before the opening of the World Exposition to be held in Tokyo in commemoration of the fiftieth anniversary of the crowning of the Mikado, *the Japanese authorities* have decided to install a complete system of modern sanitary sewerage, modeled after that of modern Western cities. As the area of Tokyo is one of the largest of the cities in the world, such a complete scheme of sewerage would require many thonsand feet of sewer pipe. Approximately $17,000,000 to $20,000,000 will be spent in this improvement, and the Tokyo system will be composite in nature, embodying the most suitable features of many cities. It is probable that the Tokyo system, however, will resemble the Berlin sewerage system in many essential features.

The proper authorities to address regarding the introduction of articles for the sanitation enterprise are K. Inuzuka, Chief of the Bureau of Public Works, Home Department, Tokyo, and the Department of Public Works, City Office, Tokyo.

MINES AND MINERALS

SIBERIA

The gold-mining territory in the vicinity of Nicolaevsk is divided into four districts—namely, the Amgun, Okhotsk Udilsky, and Amur. From 1894 to 1909 the various Russian companies took out 950,000 troy ounces of gold, valued at approximately $16,480,000 at a loss, due to the primitive manner of working the mines. The usual *method is for the owners* to work the rich spots, leaving the other places to be mined on a percentage basis, usually by Chinese and Koreans, a fixed amount of gold being delivered daily to the company, the remainder being sold at a price previously agreed upon.

The principal mines in the Amgun district are owned by the Amgun Gold Mining Co., and are situated about 300 miles from Nicolaevsk. These mines were sold to the present owners 17 years ago for $1,545,000, but have been worked at a loss ever since. In 1909 the company erected a small dredge, *which was continually breaking down,* so in 1910 a larger one was ordered from Germany, and if it gives satisfaction good results are expected.

There are many smaller mines owned by individuals and companies in this region, but several have been abandoned, and with one exception all were worked at a loss. It has been demonstratrd that the places which are considered poor by Russians can be worked on American methods at a great profit.

Orsk Gold Fields—Installation of Machinery.—The Orsk gold fields are situated about 42 miles northwest of Nicolaevsk and about 18 miles from the Okhotsk Sea, the area of the claim being about 16,000 acres. The mines were originally worked by the Orsk Gold Mining Co., which failed in 1906 after taking out, in 10 years, gold valued at $2,900,000 at a net loss of $772,500. The gold as taken from these mines is worth on an average of $14,67 per ounce, compared with $19.57 per ounce from the Amgun district.

The Orsk Goldfields (Ltd.) is installing the following improvements, which are to be completed in 1911: A 750-horsepower electric plant of 6,600 volts, and a 3-phase, 60-cycle transmission line, 10 miles long, will supply current to the electrically driven bucket dredge, with will have a capacity to dig and separate 7,500 cubic yards of gravel in 24 hours. At the powerhouse site there will be erected a Jeffrey's cable conveyer, 1,600 feet long, for wood, which will be supplied from a combination sawmill and wood-splitting plant, and there will be storage capacity for 6,000 cords of wood. It is estimated that the generating plant will be in operation 24 hours per day for 150 to 200 days in each year. The plant is being installed in duplicate, entirely of American machinery, is designed to operate at highest efficiency, and will cost, including installation, about $450,000. The power *plant will be on a small lake with* direct water communication with Nicolaevsk via the Amur River, and at this point a small city will be laid out on American plans. Streets with sewerage and water pipes and electrical conduits will be constructed, and the place made thoroughly sanitary. The houses will be of cement, concrete, and brick, and wood will be used in building homes for the officials. When everything is in full operation the population will number almost 1,000.

The new dredge which is being installed is 90 feet long, with a 45-foot beam and 9-foot draft. It has 60 buckets, with a capacity of 7½ cubic feet, and was constructed by the New York Engineering Co. The motors for operating the dredge were supplied by the Westing-house *Manufacturing Co., and* are 3-phase, 60-cycle, 440 volts each. The boilers and engines were manufactured by the Erie City Iron Works, and the engines are horizontal cross-compound. The generators were made by the General Electric Co.

Placer Mines—Russian Mining Laws.—The other districts near Nicolaevsk have shown no very rich mines, but this can be explained by the fact that little prospecting has been done. There are only placer mines in this locality, and as the gold is very fine, only the latest methods will prove successful.

Many writers in *foreign magazines have* dealt at length with the difficulties that are put in the way of foreigners mining in Siberia, but these accounts may be treated as exaggerations, as the Russian mining laws are clear, and the Government and officials offer every inducement to foreigners to mine in Siberia. The exception to this is the so-called 100-verst (about 66 miles) zone extending *along* the seacost, where it is necessary to obtain special permission to mine from the governor general of Priamur district, or higher authority. The laws appear to be fair, and if they are obeyed the officials, instead of putting obstacles in the way of the miners, will prove of great assistance to them.

Output of Gold in Amur Province.—Gold mining is by far *the most profitable in the* Amur Province. In 1908 there were 790 mines registered, of which 256 were being worked and produced 259,018 troy ounces of gold, against 342,913 ounces in 1907. The average yield per ton of gravel is from 0.04867 to 0.13144 troy ounce. According to figures of the assay offices of the Imperial Siberian Commercial and Russo-Chinese Banks, there passed through these institutions in 1908, 483,390 ounces of gold, valued at $8,615,981 and in 1909, 500,411 ounces. Cleaned gold is valued at about $10,300 per 526.5 troy ounces.

The Siberian Commercial Bank purchases gold directly from the mines, and, after it is cleaned in their assay office, shipments are forwarded every five days under a special guard to Berlin and Paris, where it is held to the credit of the bank, and this credit balance is drawn against by the head office of the Siberian Commercial Bank at St. Petersburg. This method is found most profitable, as when the Government or other banks are called upon to make large remittances to Germany or France, and the exchange rate is consequently favorable, the Siberian Bank is always in a position to meet the demand.

The quantity of gold obtained in the Amur Province from 1893 to 1903 was 4,354,713 ounces, valued at $74,910,356. Mining methods are most primitive, and it was not until the end of the working season of 1903 that the Upper Amur Gold Mining Co. introduced the first dredge into the district, and the same company has experimented successfully in a small way with the hydraulic process. The cost of labor at the mines is 77 cents to $1.55 per day. The prices of necessities are regulated by special inspectors and vary according to the cost of transportation and location of the mine.

The Richest Mining Territory.—The richest mines in eastern Siberia are located in the cabinet lands of the Transbaikal Province, where many important gold mines are being operated by the administration of these lands, and the Government is offering full opportunities for foreigners to mine there. As in other parts of eastern Siberia the mining methods are primitive, the cost of operation being high and the gold-saving process poor. Attempts have been made to use modern machinery and American mining methods, but they have not proved successful, due to lack of technical knowledge and the fact that the machinery was not adapted to the conditions, there being no doubt that many of these mines could be worked at tremendous profit. One serious drawback is the fact that the ground is perpetually frozen. Many of the properties are extremely rich in coarse gold, but the area is not sufficient for dredging on a large scale, nor would it be possible to dredge without the use of jets. The Chargotchinsky mine has recently installed about 1 mile of railway and 30 steel cars. This mine is being operated with profit, despite the fact that the methods are inferior and everything is being done by hand.

Mineral Wealth of Yakutsk Province—Coal Deposits.—Notwithstanding the great mineral wealth of Yakutsk Province, the mining industry is in its infancy. There are rich deposits of gold, silver, zinc, and platinum, and the natives living near the Maya River have been known to use the latter for bullets. Iron has been found in several parts of the Province, and copper exists near the mouth of the Kolin River, and on the Amga River are deposits of cinnabar. Rich deposits of salt and coal are found in several places, the coal fields on the Lena River extending from 66 miles south of Yakutsk in a northerly direction for about 1,200 miles.

The Due coal mine, situated south of Alexandrofsk, in Sakhalin Province, is at present being worked by private interests and during the winter of 1909-10 there were 40.000 tons of coal mined. The leading markets for the coal are Nicolaevsk and Vladivostock, the principal consumers being the Russian Volunteer Fleet and the navy. A new coal deposit a short distance from the Due mine was discovered recently and will be worked during the winter of 1910-11. A small railway has been built from the coast, and it is estimated that the output of the mine will be 100,000 tons annually.

KAIPING COAL-FIELD

Ever since the formation of the Chinese Engineering and Mining Company, Ltd., it has had to encounter strenuous opposition. The Chinese Government has consistently refused to recognize the rights claimed by the Company, and direct and indirect methods have been employed with the object of frustrating the Company's development and challenging its claims to exclusive mining rights in the Kaiping coal-field. It is unnecessary to review in detail the disputes and litigation in which the Company has been involved. We need only refer briefly to the final and most important phase, which has, now, happily, resulted in an agreement for amalgamation to work one of the most important bituminous coalfields in the Far East. The formation of the Lanchow Mining Company, to work in opposition to the Chinese Engineering and Mining Company, within the area over which the latter claimed exclusive mining rights, was only one of the many attempts made on the Chinese to oust the British Company. The latter always maintained—and in this view it was supported by the British Legation—that the Lanchow Mines were an infringement of its rights, and matters may be said to have come to a crisis in January of last year, when the Kaiping Company cut its rates in the hope of effecting by competition what it appeared impossible to achieve by any other means. in the late war that ensued the price of the quality of coal for which the demand was largest was reduced from $6.40 to $3.00 per ton, at which figure it remained until this week. Intermittent negotiations took place throughout 1911, but, without exception, proved abortive. Competition had the effect of materially reducing the profits of both companies, and the Lanchow Mining Company vainly endeavoured to obtain a loan to meet its requirements. At last both companies, realizing the futility of a further struggle along these lines, once more endeavoured to come to terms, and on January 27 last, a preliminary agreement for amalgamation was signed. This agreement was formally ratified by the British Legation and the Chinese Government on March 21, and two days later the Chinese Engineering and Mining Company took over the coal sales of the Lanchow mines.

The formal agreement of amalgamation remains to be drafted, but we are now in a position to give the main outlines of the preliminary agreement. With a view to expanding their business the Kaiping and Lanchow companies agree to form an association to be called the Kai-Lan Mining Administration. The two companies will remain separate, and each will retain its share capital, which is the same in both concerns, namely, £1,000,000 sterling. As regards profits, the shareholders of the Kaiping Company are to receive sixty per cent., and the shareholders of the Lanchow Company, forty per cent., of all nett profits up to £300,000. Nett profits in excess of that sum are to be equally divided, as are also the profits that may be derived from any new business or additional coal shafts. Nett profit is defined as meaning the profit after deducting all working expenses and paying interest and amortisation charges on the Kaiping and Lanchow Companies' existing debentures, and upon the following debentures which are to be raised by the Kaiping Company: £1,5000,000 to be paid to the Lanchow Company for payment of debts; £1,000,000 to be paid to Chang Yen-mao; £50,000 to be paid to the Kai-Lan Mining Administration; and £500,000 to be reimbursed to the Peiyang Viceroy. The only other deduction is 15 cent of the gross profits, or not less than £35,000 per annum, for a joint reserve fund. The Directors of the two Companies are to be elected according to their original regulations, but the Administration will establish at Tientsin a Deliberating Board, to which each Company will elect three members, to discuss the affairs of the Administration, and to report from time to time on its working to the Boards of Directors. All accounts, of both companies, will be kept in English and Chinese, and will be rendered twice a year. It is stipulated that the mining area of the Administration shall be limited to the mining areas of the Kaiping and Lanchow Mining Companies, within which limits no development may be made by other competitors. After the shareholders have been paid £150,000 from the profits, one-fifteenth part of all remaining profits is to be paid to the Chihli Provincial Treasury for the development of industries. The only other condition which is of sufficient importance to deserve special mention, is that after ten years from the date of signing the agreement the Lanchow Mining Company is to have the right to purchase the whole property of the Kaiping Company, at a just price, agreed up on by both parties. A supplementary agreement provides for the raising of the new debentures mentioned above, and stipulates that the final agreement, when signed, can only be determined by the Lanchow Mining Company's purchasing the interest of the Kaiping Company.

The momentous effect of the agreement we have outlined need scarcely be emphasized. It places under joint management one of the richest bituminous coalfields in the world, and at the same time creates one of the largest colliery administrations. The Kai-Lan Administration will have a possible daily output of ten thousand tons, it owns eight main and numerous subsidiary shafts, it employs over 10,000 labourers, apart from its large office and agency staffs. The amalgamation, which will shortly be followed by the elimination or absorption of dual agencies and offices where they exist, will not only effect numerous economies, but will enable the Administration to control the coal supply of North China. The nearest competitors of any magnitude are the Fushan and Pingshiang collieries, but the keen competition in the Oriental coal market may be regarded as precluding all danger of any serious increase in the cost of coal in North China. The amalgamation, therefore, may be regarded with general satisfaction. Not only does it terminate a long-standing and acrimonious dispute; it safe-guards the interests of all parties, removes all possibility of future misunderstanding, and enables Chinese and Foreign interests to co-operate where they have hitherto been in open conflict. Last, but not least, it opens the way for the acquisition of the entire Kaiping coal-field by the Chinese Company within a reasonable period, and in this respect may be regarded as a thoroughly practical scheme for enabling China to develop her mineral resources with the aid of foreign capital, without permanently alienating them from her own control.—"P. & T. Times."

Iron and Coal Production in China.—While it is probable that many of the reports of extraordinarily rich ore deposits and unusually fine coal deposits that have long been a common feature of discussion of China's natural resources and latent commercial and industrial possibilities were greatly exaggerated, enough is known of some of the deposits to warrant the statement that China is well provided with fuel and ore for iron and steel development indefinitely in the future.

At present six notable domestic sources of coal are available in China—one in the mining country centering about Chinwangtao above Tientsin, known as the Kaiping mines; another in the mines in Shantung Province, known as the Hungshan and Fangtse mines; a third in Honan along the Hankow-Peking Railway and operated by the Peking syndicate; another in Kiangsi-Honan border country south in Changsha and known as the Pinghsiang mines; a fifth in the Chingching mines in Chihli Province; and a sixth in the Japanese mine at Fushun in Manchuria; and various other smaller fields, in few of which development upon any modern scale as yet has been attempted. The output of the mines named during 1910 has been listed as follows:

Mines.	Tons.
Kaiping	1,174,312
Fushun	830,328
Pinghsiang	610,000
Shantung	482,880
Honan	357,005
Chingching	150,000
Total	3,604,525

Distribution of the Coal—Modern Works. This coal has been used in humerous local enterprises, on various Chinese railways, by Chinese naval vessels, and in Chinese Government institutions like the mints, naval depots, arsenals, and Government factories, in the Hanyang iron works and most foreign factories, and a considerable quantity of it was exported, some to the Pacific coast of the United States. The foregoing figures do not include any output of purely local nature, like that mined along the French railway in Yunnan, the small amount taken out near the rivers for steamers in Kwangtung, or, in short, purely local production anywhere. The amount listed may be termed that coal which has come into the public market in China.

The only modern iron works in China producing iron upon a modern basis and by modern methods—the only works producing pig or steel that may be counted as a part of the available supply of the world—is the Hanyang Iron & Steel Works near Hankow. The president of this establishment has informed this consulate that 303,076 tons of ore were taken from the Tayueh mines in 1910, and 130,000 tons of pig iron were produced at the Hanyang works, of which 14,034 tons were shipped to Shanghai, etc., 29,167 tons to Japan, and 15,100 tons to the United States. The Chinese exportation of iron ore in 1910 amounted to 196,000 tons. A practically unlimited increase in the production of coal and iron is only a matter of increased demand and increased investment.

Yunnan Tin Production:—The value of native exports increased in 1910 over 1909 by 50 per cent, due almost entirely to the increased output of the Kochiu tin mines. The total production amounted to 13,662,000 pounds, or 4,218,800 pounds in excess of that of the previous year, and was valued at $3,954,720. Tin prices ruled high on the Hongkong market during the year and encouraged the mine owners to work their shafts. The excellent record achieved in 1910 may induce the owners to increase the size of the foreign plant imported from Germany. The only other minerals exported in 1910 were zinc, 28,000 pounds; antimony, 122,666 pounds; and orpiment, 12,400 pounds—a poor showing for one of the richest mineral beds of the Empire.

Manchurian and Japanese Coal-Mining Comparisons.—Fushun Colliery, of Manchuria (partially described in Daily Consular and Trade Reports for Feb. 26, 1912), is a peer to the Müke Colliery (annual output 1,500,000 tons), the most extensive coal mines in Japan. The Japanese mines of the Kyushu district pay an average daily wage of 60 cents, while Fushun Colliery can obtain any amount of Chinese labor at 22 cents. Moreover, the mining capacity of the Kyushu collieries, which is put at 8,000,000 tons per annum, has attained its zenith, and hardly admits further expansion. It is possible that the present output will be maintained for 50 years or so, but not much longer. Apart from the Kyushu collieries, Japan can count for coal supply upon Hokkaido, with 1,400,000 tons, and Iwaki Province, with 800,000 to 900,000 tons, which, combined with the other sources, make a total of 7,000,000 tons per annum. Of this grand total of 15,000,000 tons, Japan can spare only 3,000,000 tons for export. (C.R.)

Hongkong Coal Trade.—In spite of varied conditions in the trade of the port in general the coal trade of Hongkong in 1911 remained fairly steady. The total imports were 1,261,671 tons, as compared with 1,286,330 tons in 1910 and 1,219,930 tons in 1909.

The only notable trade features last year were the disposition to drop some old time supplies, such as Cardiff and Australian coal, and to take new supplies from eastern sources, particularly from portions of French China (Hongay: 139,610 tons) and British North Borneo (Pulo Laut, 37,450 tons). Japanese coals dominated the market as usual, and in that connection it might be stated that for the first time coal from Formosa was imported commercially into Hongkong. This Formosan cargo of 2,080 tons made the total imports of coal from Japanese sources for the year 932,856 tons, as compared with 932,780 tons in 1910 and 924,780 tons in 1909.

Of these imports 606,000 tons were handled by the Mitsui Bussan Kaisha, 125,000 by the Mitsui Bishi Goshi Kaisha, and about 40,000 tons each by Ataka & Co. and Bradley & Co.

Australia dropped out of the market altogether and no coal from that country was imported commercially during 1911, although two years ago over 46,000 tons were brought in. Of Cardiff coal only 5,000 tons were imported commercially and most of that was exported north later, the rest being for account of the British Navy here. Chinese coals, both Kaiping (40,130 tons), and Manchurian (53,575 tons) fell off considerably, and Haifong and Tonkin coal (16,150 tons) also showed reductions.

The rise of Pulo Laut sales has been due to systematic canvass of the market. It is somewhat significant that so far only the Pulo Laut coal, among the smaller sources of supply, has been able to gain a hold on the market, shipments from Kebao, Tourane, Batan, Tsingtau, Brooketon, Labuan, and other places so far having proved failures financially. The falling off in imports of Manchurian coal was due, to some extent at least, to troubles in China.

The exact tonnage taken by Canton from the Hongkong market is not known at this time but is reliably estimated at 170,000 tons, or about 18,000 tons less than in 1910. Shipments to other ports trom Hongkong were less in 1911 than in 1910. (C. R.)

Hainan:—During the past year work in the tin mines at No-doa, located a little northeast of the center of the island, has been commenced and is being prosecuted with some success, though the process of mining is crude. The ore is said to run about 60 per cent tin. The product is shipped from Hausui Bay, on the west coast of the island, in a small steamer belonging to the company and is cleared through the Kong-moon customs for Hongkong.

Formosa New Coal Mine.—In central Formosa a large deposit of coal has been found in the Nanto Prefecture. The quality is not very good, but accessibility and quantity are such as to encourage the development of a mine. Some time ago applications were filed with the Government for obtaining license to carry on mining in this Prefecture, but the Government was disinclined to allow operations because of the proximity of the deposit to the territory of the aborigines. Now that the lines against the savages have been advanced, the Government will grant the present application. The sugar companies of south and central Formosa, who now import coal from Japan, will be supplied from the new mine.

Japan:—Several Silesian spelter-smelting houses have recently received important orders from Japan for spelter sheets.

Coal Discovery.—It is reported from Muroran, Japan, that a large vein of coal has been discovered some 60 miles from Sarufutso, Kitami Province, by a surveying party sent by the Mitsubishi Co. The coal field, it is stated, covers some 100,000,000 tsubo (tsubo =35,581 square feet).

Siberia New Gold Fields.—According to information from the district geologist of the Yakutsk Province, large gold fields have been discovered along the Billiuiu River, about 300 miles from the town of Billiusk, and in the sources of this river in the Yakutsk Province. Gold fields have also been discovered in the river systems of the Katrni and Biu Rivers in the Altai district.

Siberia—From information collected by the Amur Expedition the amount of gold (in troy ounces) handled by the various gold laboratories in Siberia in 1910 was as follows: Siberian Bank, Blagoveshtchensk, 330,545; Siberian Bank, Irkutsk, 10,730; Government laboratory, Blagoveshtchensk, 273,534; Government laboratory, Irkutsk, 175,785; Government laboratory, Nicolaevsk, 53,599; total, 844,193.

Formosa.—The Formosan Government has granted a license to three Japanese to exploit a copper mine said to have been discovered in Dai-Nanwo, Rato, Giran Prefecture.

Graphite in China.—According to Consul Julean H. Arnold there is said to be much graphite in the vicinity of Amoy, and it is anticipated, when mining operations are commenced in that section of China, that the region will be able to supply a considerable quantity of graphite. Of just what quality or grade it will be the consul cannot say at the present time.

Siberia: A Gold Deposit of exceptional richness is rumored to have been recently discovered at the Luibavinsky mine, on the River Onon, about 200 miles from Chita. It is reported that there is more than I pound of gold to 1½ tons of gravel.

Siam Coal Supply.—Only brown coal or lignite has thus far been found in Siam. As imported coal is too expensive for fuel for manufacturing purposes, wood and paddy husk take its place, but the local supply of firewood does not seem to be sufficient, as $16,247 worth of wood was imported in 1911. The coal and coke imports for 1911 amounted to 13,613 tons, valued at $78,638, as against 24,178 tons, valued at $159,176, for the previous year. Of the coal and coke imports for 1911, the United Kingdom and dependencies supplied 7,758 tons, Borneo 1,631 tons, and Japan 4,224 tone.

Tongkah Harbour.—The output for the Tongkah Harbour Tin Dredging Co. for the fortnight from March 17 to March 23 was 23 tons (386.40 piculs).

The Kanaboi Tin Co.—At the annual meeting of the Kanaboi Tin Co., Ltd., the accounts showed a profit of $6,859 to be set against a debit from 1910 of $7,984. A liberal depreciation was allowed and $29,000 had been paid off mortgage and loans. Only $5,000 now remained to be paid off.

Ting Kit Tin Mines.—The prospectus is issued for private circulation of the Ting Kit tin mines, with a nominal capital of $500,000 in $10 shares, of which 40,000 only is offered for subscription.

The directors are A. B. Allen, J. W. Vander Stadt, and the secretaries McAlister and Co. The property to be acquired is 1,078 acres, adjoining the Middleton mine, Johore. The property is partly prospected and five acres yielded 4,000 piculs. The report of experts indicate that there is a large area of land containing tin. It is proposed to start with dredging plant and $50,000 is considered sufficient as working capital, $20,000 of this being put out by a syndicate, half cash and half subscribing shares.

Serendah Hydraulic.—The output of the mine for the year was piculs 1,476 which was sold at an average price $52.05 as against piculs 3,356 sold at an average of $45.80 per picul during the year 1910. 387,000 cubic yards of an average value of 38 of a catty per cubic yards were sluiced as against 562,400 cubic yards of an average value of ·60 of a catty per cubic yard for 1910. The average working cost per cubic yard was 88 cents in both 1910 and 1911.

The gross profit for the year was $49,421.14 and after allowing the sum of $3,987.43 depreciation on buildings, tools and plant, etc., there remains a nett profit of $45,433.71. A dividend of 5 per cent was declared.

Sungei Gau Tin.—Mr. G. A. Derrick, who presided at the third ordinary general meeting of shareholders in the Sungei Gau Tin Mining Co., in reviewing the work of the past year said that considering the small battery with which the company was working the results were not unsatisfactory. The lode they were working was a very poor one as the ore was heavily charged with pyrites so that he thought, all things considered, the result of the year's working might be looked upon as satisfactory, although they were not in a position at the moment to declare a dividend. After writing off one third of the preliminary expenses and making allowance for depreciation, the profit amounts to $2,780.78.

Royal Johore.—The report of the directors of the Royal Johore Tin Mining Co., Ltd., states that the amount of ore received during the year was 739 piculs against 920 piculs in the previous year. The falling off is explained by the Temanoh syndicate having ceased working. The net profit amounted to $6,534.79. The directors recommended a dividend of five per cent., directors' fees $1,000, and carry forward $47.29.

Selangor Coal.—The following appears in a report by Mr. Scrivenor, F.M.S. Geologist:—

During the year prospecting work by diamond drill, hand-boring tools and pits, has been carried on by Messrs. Osborne and Chappel, with Mr. Mungo Park as Resident Manager, on behalf of the Rawang (Federated Malay States) Coal Syndicate, Limited, of London. This has been followed with great interest in connection with my report on the coal-measures as a check on the accuracy of the limits mapped by means of the soil derived from the coal-measures and its difference from the soil formed from the older rocks. As far as can be judged at present, it appears that the area given was too restricted, since the soil from the older rocks, which form hilly ground, overlaps that of the coal-measures.

Mining in French Indo-China.—The hitherto existing mining legislation of French Indio-China has just been reformed and completed in a decree issued by M. Lebrun, Minister for the Colonies. The general tendency of this new legislation is to simplify the regulations at present in operation and to avoid the disputes to which the lack of precision of preceding legislative provisions gave rise. Thus the decree of 1897 distinguished three categories of mines, and the result was that in some cases three mining concessions were superposed and the three concessionaries disputed regarding the extent of their rights. The new project only maintains one kind of concession, this giving the right to exploit all mineral products comprised within its limits. It may be noted the one clause of the new decree forbids possession or exploitation of mines to foreigners, and forbids also the taking of direct or indirect interest in the exploitation of the colony's mines to certain classes of officials. Further, instead of effective occupation giving the right of priority for the acquisition of prospecting rights, this will henceforth be determined by the deposit of the application at the offices of the chief of the province.

Siberia.—In the basin of the Lamur, a small tributary of the Amur, gold fields were recently discovered which at first were secretly worked by 300 Russians, Chinese, and Koreans. At present there are three gold prospecting parties on the fields representing various companies, who have reported further finds. A large number of gold finds have also been made on the right bank of the Lower Amur.

Mitsui Coal Interests.—Since its recent purchase of the Noborikawa coal mine in Hokkaido, the Mitsui firm has been making preparations to extend its mining operation in Hokkaido. The firm got the Railway Board to build a branch line to the colliery branching off from the Koede station on the Hokkaido railway for the transportation of the output, and the branch line has now been completed. The line was built under the conditions that the firm continue to work the colliery for the next ten years or to bring up its output to one million tons at an earlier or a later date. The firm is evidently bent on making the colliery a base for its coal mining enterprise in Hokkaido and is now carrying out its extension, the work of which is to be completed in about one year's time.

Mitsu Bishi's Enterprise in the Hokkaido.—The Mitsu Bishi Kaisha's enterprise in the Hokkaido has been brought prominently before the public notice since the firm has recently entered into an agreement for the accommodation for capital to the Oyubari coal mines, conditional to the sale of the output through the hands of the firm. The firm have also purchased over fifty coal mines in Teshio and Iburi province in Hokkaido and are now negotiating for the purchase of a large coal mine. On the successful conclusion of the purchase the firm will commence the working of the several mines. As the first step of the exploitation in Hokkaido the firm is reported to have decided to establish its branch office in Sapporo and Mr. Miyakegawa, at present the president of the Shanghai branch, will be transferred to the presidency of the new branch office. The future of the Mitsu Bishi's enterprise in the Hokkaido will be watched with considerable interest.

HAN YEH PING

Annual Meeting of Shareholders is Held At Offices of Company.—Three hundred and thirty shareholders of Han Yeh Ping Iron and Coal Co., Ld., attended on the 12th inst. at one o'clock an annual meeting held at its local head office No. 110 Bubbing Well Road, Shanghai. After the report of the company's work and financial standing of the past year read by Director Wang Tse-kyi the following new directors were elected by ballot:—Messrs. Chao Chu-chuan, Sheng Kun-pao, Yang Hang-cheng, Hu Pai-liang, Chu Pansan, Yuan Pai-kwei, Nieh Yuan-tai, Wong Tse-kyi and Shen Tung-ho. Messrs. Chu Tse-yau and Yang Yi-tse were appointed auditors.

Mr. Wang reported that the total income of the company last year ending 8th moon amounted to Tls. 6,034,618.95. Owing to the recent revolution and to the stoppage of railway construction in the country the company sustained a great loss of business, the preceding income being about Tls. 8,000,000. Mr. Wang proposed that the initial capital of $13,160,000 be increased to $30,000,000, by issuing additional shares of $50 value each. The proposition after some discussion was carried.

When the question of dividends was brought up before the shareholders many conflicting views were presented. It was decided, finally, that the usual 8 per cent. devidend be distributed in shares of the company thus leaving the cash reserve intact..

Pen-Hsi-Hu Mine Progress.—The steel enterprise undertaken as subsidiary work of the Pen-hsi-hu coal mine is said to be progressing favourably. The experts sent abroad have already concluded necessary investigations, and the Chinese capitalists have announced their readiness to pay in 200,000 dollars as the second instalment of their subscriptions toward the great foundry fund, the Chinese share of which amounts to two million dollars. The Okura firm also decided to meet the call for the second instalment. On the conclusion of the payment, the proceeds will be appropriated to the purchase of the necessary machinery and the work will be actually commenced. It is stated in this context that it is thought advisable to seek the market in China and Chosen for the output for the Penhsihu mine, and the company has decided to extend the market in the direction of Chosen, Shanghai, and Hongkong.

To Work Tayeh Mines.—The Bureau of Finance has proposed that two million taels will be given from the Government from to develop the mines of Tayeh district in co-operation with the people. The name of the company will be "Ta Hsin Kung Hsi, Limited." This proposal has been delivered to the Emergency Assembly for consideration. —Hankow Daily News.

Oil in Hokkaido.—It will be remembered that a few years ago the International Oil Company abandoned its enterprise in Japan, selling to Japanese at a considerable sacrifice its refineries in Echigo and its works in Hokkaido. The engineers of the Company had doubtless convinced themselves that to continue operations in Hokkaido would be simply to throw good money after bad, and they advised the speediest possible withdrawal from the unprofitable scene. The Japanese company which then came into possession of the works, went on boring here and there, and it is stated that at a place near Ishikari indicated by an eminent Japanese engineer, Professor Otsuka, a large source of oil has been tapped. This statement must be taken with reserve. On no subject has there been a greater disposition to exploit public credulity in Japan than on the subject of oil wells. There is an element of speculation in searching for this hidden treasure, and operators upon 'Change have often profited by skilfully circulated rumours. It is true that the International Company entered the Japanese field as much for the purpose of proving the non-existence of oil in these islands as for discovering it in quantity. But the Company had in its employment experts of the highest experience and knowledge, so that we hesitate to credit any statement impugning the soundness of their judgment. The newly-found well at Ishikari may turn out to be a very ephemeral affair.

Chosen Gold Mines.—Registered in London with capital of £74,400 in £5 shares, to acquire any mines, mining rights, and metalliferous land in Chosen (Korea), or elsewhere, and to adopt an agreement with the Korean Exploitation Syndicate. The signatories are: H. Collbran, Caxton House. Westminster, S.W.; M.P. Soyce, M.P., 3, Buckingham-gate, S.W.; E. T. McCarthy, 10-11, Austinfriars, E.C.; F. H. Rawson, 5, Whittington-avenue, E.C. (20 shares each); H. R. S. Aldon, Caxton House, Westminster, S.W.; F. P. Worsely, Caxton House, Westminster, S.W.; S. M. B. Aoki, Caxton House, Westminster, S.W. (one share each).

To Refine Zinc in Japan.—The refining of zinc is still a difficult problem for our mining engineers and has been almost abandoned as impossible. Repeated experiments by specialists have proved unsuccessful. The mineral, the production of which is yearly increasing, is accordingly exported aboard in the raw state and reimported to this country after being refined. The reason the mineral cannot be refined here is the lack of the clay for the manufacture of necessary retorts. To analyse and refine zinc ores in Japan there must be imported the necessary raw material and, first remunerative, and it makes no difference, from a business point of view, whether the ores are exported and imported in the refined state. This accounts for the failure of repeated experiments. With the recent progress of electric industry in this country, it was attempted to refine zinc by the use of electricity process, but without success.

Mr. Nishimura, expert of the Mitsui Mining Company, who has recently returned from Europe, has invented, as the result of his researches and investigations while abroad, a method of producing a special kind of retort that will stand any heat. It is made from common clay, hardened by special process. The Mitsui Mining Company has decided to start a zinc refining business adopting the method invented by Mr. Nishimura and utilising the zinc ores produced at the Company's Kamioka mine. The factory will be established in Kyushu near the Miike colliery. The factory will be placed under superintendence of a foreign expert, and will be completed and ready for operation by next Spring.

The Menglembu Lode Syndicate Ltd., announces that all debts and the mortgage, which on Sept. 30, 1910, stood at a total of $110,000 would be completely paid off by the middle of May from which time the Company would enter on a dividend paying era.

The mine is splendidly equipped with lode mining machinery unequalled in Perak.

COMMERCIAL NOTES

Copra Trade.—The substitution of soya-bean oil for some purposes has caused some consternation among copra producers in the Philippines and the East Indies. The demand for copra and coconut oil is increasing so rapidy, however, that commercial circles in the Far East appear to regard any serious interference with the copra trade from such substitution as unlikely.

Philippine Cacao Culture.—A determined effort is being made to stimulate the production of cacao in the Philippines both for local consumption and for export to the United States. Cacao is now produced in partially all portions of the archipelago, but the production is small, apparently because of the time required for bringing the trees into bearing. The Filipinos use cacao freely when it can be had and understand its manufacture. About 2,000,000 pounds are imported annually, most of which is from the East Indies in crude form for manufacture in the Philippines. Three Spanish factories for the manufacture of chocolate and cocoa have long existed in Manila. The Government authorities in the islands believe that the cultivation of cacao would be profitable from an agricultural standpoint and would add to the industries of the islands as well.

Linalol Oil Extraction.—The Formosan Government has recently granted a license to the Mitsui Bussan Kaisha to engage in the production of linalol oil a by-product of a certain species of camphor trees, which abound in Formosa. The oil is highly valuable in preparing perfumes. It is found now principally in Mexico and Venezuela. The term granted to the Mitsui Bussan Kaisha will expire March 31, 1912, but it is expected that about 300 kilos will be produced during that period.

Fishing Industry.—The local government of the Pescadore Islands is planning to improve the fishing industry. It intends to buy a steamboat equipped with an oil engine. The Pescadore Islands is the seat of Japan's southernmost naval station.

Caviar Prices.—According to information from Nicolaevsk, the prices on Keta and salmon caviar are gradually increasing, $1.10 to $1.15 per pood (36.112 pounds) being offered for Keta and $6 to $7 for salmon caviar during the latter part of November, as against 90 to 95 cents and $4 to $4.75, respectively, a month previous.

PHILIPPINE MINING NOTES

Luzon Gold Company:—Sluicing is expected to commence in June on the properties of the Luzon Gold Company. The first work to be undertaken will be the sluicing of some bench claims, and a large number of native laborers will be required for this purpose. The laborers will be recruited in Nueva Ecija and proceed overland to the mining properties on the Umirai river. Water will have to be carried from the river over a distance of about 1500 feet, and for this purpose 2000 feet of miners' hose have been ordered from the United States.

This property is but a small part of a vast section including hydraulic, dredging and sluicing ground which has been acquired by the Luzon Gold Company. The company has vast placer holdings in a district hitherto undeveloped, partly situated in Tayabas, province and extending into Nueva Ecija and the headwaters of the Umirai river which empties into Dingalan bay about 100 miles north of Atimonan on the Pacific coast.

The Umirai river is the same river on which is situated the property for whose development the Squires brothers recently made arrangements with Australian capital for the placing of a dredge. The Squires property is located on the lower part of the river.

Headwaters Mines:—Operations have been resumed in the Headwaters Mines district to the northwest of Baguio.

Smith, Bell and Company have taken over the project. All encumbrances of the mine were cleared away by the payment of P50,000 to L. O. Hibbard, who was appointed receiver when the Hongkong capitalists abandoned the property. Engineers who have since investigated the lead of the Headwaters mine declared that it is a valuable property.

New Dredge Obdered:—The new dredge for the Squires gold mining property on the Umarai river has been ordered from Melbourne and will arrive during the present year. The dredge will be all steel and will have steel pontoons. It is of new pattern, the chain elevator having been abolished, and instead the buckets are fastened to what resembles a huge water mill wheel. The dredge complete, including steel pontoons, will cost £20,000, delivery at factory. The purchase of this modern dredge is a result of the recent investment of Australian capital to the extent of £50,000 in the Squires property.

O. K. Mining Company:—Articles of incorporation were filed in April with the government by the O. K. Mining Company, a corporation having its head offices in Baguio The company has a mining property in the Benguet mountains, which the articles of incorporation state will be developed by either the lode or placer methods.

The directors and incorporators of the new mining company are John L. Fraser, J. F. Tessar, A. W. Simmons, J. J. Murphy and Hurry H. Herbert. Mr. Herbert has been elected treasurer of the company. The capital stock amounts to P26,000, divided into shares valued at 1.00 each. Of this stock issue P12,000 has actually been subscribed and paid up. Subscriptions certified to by the treasurer are as follows:—

John L. Fraser, P5,454, J. F. Tessar, P1,091, L. W. Anderson, P1,091, A. W. Simmons, P1,091, Pilar Palacios, P1,091, J. J. Murphy, P1,091, and Harry H. Herbert, P1,091. The organization of the O. K. Mining Company was effected at a meeting held in Baguio on March 4.

Batan Coal Report.—The U.S. government bureau of mines coal testing plant of Pittsburg, Pa., has reported on the fifty-ton sample of East Batan coal sent by E R. Hix, coal expert of the insular government.

It says that Batan coal evaporates but 20% less water than the best grades of Japanese and 30% less than the best grades of Australian coal.

The coal when received by the bureau of mines contained 60% of slack 15% of lump and 25% of small lump, which greatly reduced the steaming value of the sample. The average run of mine coal contains about 60% lump, large and small, and a certain per centage of nut coal, reducing the less valuable slack to an unimportant percentage.

The report further states that even in the condition in which it was received, the Batan coal equalled in steaming qualities the best grade of Labuan (Borneo) coal, which is mined and shipped in great quantities.

An exhaustive report recently made on Batan coal by Mr. Hix says that basing the steaming value of the coal on the figures available, which do not represent the actual value of the coal, it is worth P7.20 per ton laid down in Manila, and that it can be laid down here at a cost of P4.00 per ton.

The nine can be made to prodube 5,000 tons of coal monthly.

There are many coal properties in the islands which are awaiting the development of the Batan mine before doing extensive development work on their own account, and it is very probable that the industry will be given a boost by the report received from the United States bureau of mines.

Tayabas Oil Fields; P.I.—The department of the interior, has approved the making of a topographic survey of the Tayabas peninsula, where are located several hundred petroleum placer claims. A small amount of development work has been done in this district to determine the presence of oil in paying quantities, but before work of a serious nature can be done a topographic and geological survey is desirable.

The bureau of lands has been directed to proceed with the triangulation and topographic survey, the maps of which, upon completion, will be turned over to the geologists of the bureau of science. A preliminary reconnaissance of the peninsula will be completed by the bureau of lands before the rainy season. The area to be covered by the topographic map lies south of a line between the towns of Catananan and Peris, and contains approximately 4,000 square kilometers. Upon the termination of the preliminary reconnaissance of the peninsula the triangulation and topographic parties of the bureau of lands will go into the field and complete the work before the next succeeding rainy season.

Philippine Co's New Dredge:—The machinery for a five and a half foot close connected gold dredge built by the New York Engineering Company, measuring up some seven hundred tons has arrived in Manila for the Philippine Exploration Co.

The company has been engaged for some months past in the construction of the hull of the dredge. It is now nearing completion and will be launched the end of April.

CEMENT NOTES

Straits Settlements.—Imports of cement into the Straits Settlements for the year 1909. No later statistics are available:

Countries.	Casks.	Value. Gold.
United Kingdom	223,856	$539,089
Burma	10	51
Hongkong	34,223	88,508
Johore	3	10
Perak	10	28
Selangor	70	227
Austria-Hungary	17,253	40,316
Belgium	1,747	3,879
Denmark	8,000	18,034
Germany	5 196	13,425
Netherlands	1,000	2,386
Bussia	3,000	5,964
French India	40	85
French Indo-China	421	854
Japan	5	11
Total	294,834	712,867

Philippine Islands.—Apparently Hongkong has regained its hold upon the cement trade of the Philippines at the expense of American cement exporters. The imports of cement into the islands in the fiscal year 1911 show a large increase in the total receipts, but a decided decrease in cargoes from the United States.

The enactment of the tariff law which admitted American cement free of duty into the islands was followed by a gain in imports of American cement. The imports of cement into the Philippines for commercial, as distinct from governmental, purposes were 28,418 metric tons, valued at $331,143 in 1908, the United States having no part whatever in the trade. In 1909 the imports were 25,040 metric tons, valued at $247,425, of which the United States supplied less than $300 worth. In 1910 the commercial imports were valued at $416,815 and included 42,776 metric tons, of which 9,227 tons, valued at $103,078, were from the United States.

This increase in the total imports was more apparent than real, for the reason that the fiscal year 1910 was the first year in which imports of cement for governmental use were included in the commercial import figures.

Trade Fluctuations—Increasing Use of Cement.—The increase from the United States, however, was real and represented an effort on the part of American exporters to get trade that theretofore had been largely in control of the Hongkong cement manufacturers in competition with the cement factory at Haifong, in Indo-China, and a Chinese Government-aided factory near Canton. In the fiscal year 1911 the total imports of cement into the islands amounted to 55,480 metric tons, valued at $526,456, an increase of 12,704 metric tons, valued at $109,641. The purchases from the United States, however, reached a value of only $71,436 as compared with $103,078 the year before, while imports from other countries increased from $313,737 to $455,020. While some small shipments continue to come from Germany, Belgium, China, and other countries, the greater portion of the trade in the islands is now divided between the Hongkong concern and the Indo-China factory, Hongkong having much the larger portion.

In connection with the figures of the fiscal year 1911, which show a large general advance in imports of cement over previous years, it is noted that, while most of the increase is due to the building of bridges, municipal and other structures, and various public docks and similar works, there has been a notable increase in sales of cement to Filipinos for general purposes. The use of concrete by Filipinos and Chinese in the islands is greatly on the increase. Even in nipa houses the posts are being placed in concrete foundations nowadays. It is likely, therefore, that trade in the future will continue to expand rapidly. (C. R.)

Burma.—Cement is used to a considerable extent in Burma. Modern steel-framed buildings having brick walls with cement facings are now being erected in Rangoon. The public Works Department of the Government of Burma employs a great deal of cement in the construction of public buildings, bridge work, etc. The Rangoon Port Trust is engaged in the construction of a large training wall, for which much cement will be needed during the next five years.

The imports of cement into Burma during 1910 were as follows:

Countries.	Cwt.	Value.
Great Britain	222,500	$145,439
Hongkong	57,822	36,625
Belgium	20,413	11,548
Austria-Hungary	12,895	7,487
France	3,032	1,904
All other	2,123	1,497
Total	318,785	204,500

Siam.—Concrete construction is extensively employed by the Siamese Public Works Department and private concerns for foundations of large public buildings, walls of canal locks and sewers, in the construction of bridges, and for many other purposes, but the cement needed is not manufactured locally, although abundant material for its production is found not far from Bangkok. The customs returns show a steady increase in the amount of cement imported yearly, the receipts for the fiscal years 1907-8, 1908-9, and for 1909-10 having been valued at $158,273, $140,069, and $223,428, respectively.

The imports of cement by countries for the above periods are shown in the following statement: (C. R.)

Countries.	1907-8	1908-9	1909-10
	Tons.	*Tons.*	*Tons.*
Singapore	86.02	253.16	52.11
Hongkong	454.05	2,475 04	3,894.18
United Kingdom	1,292.01	687.12	1,350.06
Germany	3,241.12	3,032.14	3,507.06
Denmark	5,6[illegible]7.09	3,960 00	8,411.07
Belgium	231.13	1,523.09	1,427.14
Cochin China	....	933.02	2,146.14
Other countries	224.69	668.53	590.03
Total	11,206.11	13,532.10	21,378.06

Green Island Cement Company.—Some interesting information on the cement industry of the Far East was made public in the speech of Mr. C. A. Tomes before the annual meeting of the Green Island Cement Company held at Hongkong on April 23rd, ulto., and from which we extract the following:—

At the different works of the Company nothing very eventful has occurred during the year. In the spring Hok Un worked half time only, owing to the slacknesss of demand, but as the year wore on the output was gradually increased until in August and September everything was going at its fullest power and a market was found at covering rates for all the cement that could be made, and this continued until the end of the year and later to February this year when, for the purpose of relining, some of the Aalberg kilns were closed. These we shall except to start again within a month or two, although in these disturbed times we shall not pretend to make any accurate forecast of the work ahead of us.

The Macao Works were kept steadily and fully going all the year on clay preparing and drying; and four out of the five kilns have been kept burning (it is usual to hold one in reserve) from September on to the present time. Deep Water Bay was on half capacity for half the year and run full time for the remainder.

The quality of the cement has been maintained at the highest degree and there have been no rejections for quality anywhere.

Competition continues unabated but has somewhat changed its form. European shipments have decreased to the Far East and in the main can be ignored. The establishment of new factories in near by territory is what interferers with us most, and some of these are gradually improving the quality of their manufacture and increasing their output. There are probably more factories in the East than the average man realizes, for besides the numerous Japanese establishments, including Manchurian, we have those at Tongshan (Tientsin), in Hupeh, on the Yangteze, at Haiphong, at Kuala Lumpur, and a new one at Pakang in Sumatra, and there may some day be one in Manila. To put against the rise of these establishments we have the undoubtedly ever-increasing call for cement. And if this increase continues in years of stagnation and troubled trade such as we have experienced lately, what may it be when China settles to a steady course and the inevitable railway building comes into full swing?

The cement industry the world over is far from being an even and steady-going business. It has had great vicissitudes in England, and after the depressing times in that country of two or three years ago the shares in the largest organisation there have risen to ten times their previous lowest quotation—that is the common shares—a fluctuation beyond anything we have ever seen. In America in the past twelve months, the largest company, and the largest single company in the world, fell upon evil times and had to be reorganised from the bottom, competition became unparallelled and prices cut so low that the highest grade cement was selling at the works, luckily for us at interior points, a 45 gold cents per barrel in bulk, *i.e.* without counting the cost of the barrel.

I have mainly dwelt so far upon the consuming side of our product. A word now on, perhaps, a more important factor, the supply of raw material. Limestone causes us as much anxiety as ever, for though the Canton authorities stand at the moment no longer in our way as rival buyers or promoters of difficulties for us, through the disturbed state of the delta and the consequent piracy the stone contractors find increasing trouble in securing boats and in getting them through to Hongkong. The supply of wood for casks is suffering from the same disability, and unless we can soon feel assured of a quick cessation of these hindrances we may come face to face with a serious situation. We have sufficient contracts for stone and dealers are eager to sell at a price, but we shall be more relieved when we see the stone arriving in much larger quantities than is now the case.

BUILDINGS

(*Continued from page 26*)

The new building will be of steel frame, not less than four storys high, with elevators and will be the most modern and up-to-date building in the city when completed.

This property has a frontage of 100 feet on the Escolta and extends to the Pasig River and contains over 1,800 meters. The purchase price was P.200,000.

New Iloilo Hotel.—A company has been organized to operate a modern hotel in Iloilo, construction on which will be begun within the next three months.

The capital stock is P.300,000, divided into 3,000 shares at a par value of P.100 each.

An area comprising 6000 meters of land has been purchased. The building will contain 60 rooms and be of concrete throughout and equipped with all modern conveniences.

The officers of the company are; Antonio E. Barretto, President; Ruperto Montinola, Vice-President; and A. J. de Souza secretary-treasurer. Other directors are: Esteban de la Rama, Espiridion Guanco, E. E. Calvin, D. M. Stewart, Juan de Leon, Juan Mencarini, and Celso Ledesma.

Mr. A. J. de Souza will leave for Cebu next week for the purpose of organizing a similar company to operate a modern hotel in that city also.

NEW WAREHOUSE, CEBU.—The new concrete warehouse of the Pacific Commercial Company on the waterfront front is rapidly nearing completion. It is rumored that other firms are planning similar work in the same locality.

PROVINCIAL BUILDINGS.—On a centralized location in Cabanatuan, the capital city of Nueva Ecija, that province is now building permanent government buildings of reinforced concrete, not only for all offices for provincial officials, but for housing the Cabanatuan public school and the provincial high school.

A plan drawn up by Consulting Architect William E. Parsons, places the six buildings required, an athletic field, a public plaza, six tennis courts, and a park on a site measuring 410 by 400 meter. This centralization of government buildings in provincial capitals with school facilities on one beautiful site has also been done at Santa Cruz, La Laguna province, where permanent concrete structures were erected. A simalar plan was followed out in Malolos, Pampanga, although the buildings are not constructed of permanent material.

It is estimated by the provincial division of the bureau of public works that the whole construction can be completed for P.135,000, The work is being done under contract by John Gordon. Plan 10, of the bureau of education, has been adopted for the central school, providing a building of ten rooms for the children of the town, at a cost of P.20,000.

NEW MCCULLOUGH BUILDINGS.—The Three buildings that house the big establishment of E. C. McCullough and company were opened on April 1.

In the front end of the P.60,000 concrete building is a full line of stationary supplies and books. In the rear the offices. The building is two stories high. The second floor is used for bicycle, automobile sundries, typewriter and other supplies. The building is ventilated by the new system of the American Blouer Co., through vents in the floor, through which air is forced by a fan attached to a twelve horsepower motor.

The three buildings, which adjoin one another, have a total floor area of 90,000 square feet. One of the buildings is used as a warehouse and automobile showroom. The third building, which is back of the concrete building and faces on the river, is used as a supply dept for paper and stationary.

The second floor of the building holds the printing shop, probably one of the best equipped in the Orient. There are several job presses and monotypes and the normal force of men at work numbers 200.

NEW FACTORY BUILDINGS:—The Manila Refining Company will construct four reinforced concrete factory buildings, one for the manufacture of candles, another for the manufacture of fertilizers, one for refining, and the fourth for a store house at a cost of approximately 40,000 pesos. Work on their construction will begin as soon as the work of driving piles for the foundation is finished. The contract for the construction has been let to W. A. Crossland and J. Hickman, who expect to finish the work in six month.

The Manila Refining Company, has for several years been located near Caloocan, where they have been turning out a product of very high grade candles and fertilizers.

Delmar Smith Clinton has been awarded the contract for constructing the new Malate school, his bid being P74,465.

A meeting of stockholders of the Army and Navy Club, Manila, was recently held for the purpose of discussing the advisability of an appropriation of P60,000 for an extension to the present club building in the new port district.

MANILA.—Bids were opened on April 20th, for the construction of two reinforced concrete apartment houses for the Manila improvement company. These new apartments are to be an innovation in the way of buildings for Manila, each building having four distinct apartments, built much as in the United States. They are to be started immediately on the corner of Divisoria and Dakota, Ermita.

The following bids were opened and taken under advisement:

Calvin and Loper, P37,850; time 140 days.
John H. Murphy, P53,720; time 145 days.
W. W. Colman, P39,700; time 120 days.
M. Manade, P43,200; time 150 days.
O. F. Campbell, P45,875; time 6 months.
Delmar Smith Clinton, P55,300; time 6 months.
J. W. Odom, P36,698; time 120 days.

A new theater is to be built in Vladivostock by the Clerks' Club.

PROPOSED RUBBER EXPOSITION IN JAVA.—Consul B. S. Rairden, of Batavia, Java, has been notified by the Director of Agriculture of the colony that an International Rubber Exhibition will be held in Batavia during the first half of the year 1914, under the patronage of his excellency the governor general. The exact date has not yet been decided.

REBUILDING OF HANKOW.—Mr. Percy Tilley, a Shanghai architect, has gone to Hankow to assist in the drafting of plans for the rebuilding of the burned district into a modern model city. Since the political upheaval at Wuchang, and the subsequent burning of the native city of Hankow, that part of China, once the commercial center of the interior, has been reduced to ruins and deserted. As Hankow is not likely to be exposed by renewal of hostilities, the board of industry of the Wuchang provisional government, President Sun Yat Sen, and the Chinese merchants of Hankow, notably Messers. Chang Chan, Wu Pay Ling, and Sun Wei Chung, have formulated elaborate plans to transform the deserted city of Hankow into a commercial seat.

A new bund, with lofty buildings, wharves, broad roads, and other commercial facilities, will be the principal feature of the reconstruction. Thirty-four roads will be laid out. The landowners will contribute 10 per cent of their acreage for these highways and for sites for public buildings and parks. The landowners have been instructed to establish their claims to their respective holdings in the burned area, and new title deeds will be issued.

The Commercial Building Corporation will float a loan of 15,000,000 taels $9,200,000), guaranteed by the Republican Government, it is said, and this will provide for the erection of 30,000 houses.

An appropriation of $50,000 will be asked for at the coming session of the Imperial Diet for establishing an industrial school in Taihoku. The school is intended by the Formosan Government to be devoted almost exclusively to manual training of the native Formosan (Chinese).

A new agricultural high school will soon be established in Blagovieshtchensk.

EXPOSITION IN SIBERIA.—Expositions are not new in eastern Siberia, several having been held, the last in 1899 at Khabarofsk, on the Amur River. In order to call attention to the country's progress and show the development of the Russian Far East since then, the local authorities have decided to hold another in 1913, which will also celebrate the three hundredth anniversary of the Romanoff reign in Russia. It will be held during August and September, as the Priamur Region Exposition of 1913, at Khabarofsk, the capital of Priamur district.

Special buildings will be erected, and permits for space for exhibits will be granted on application. Gold, silver, and bronze medals, as well as diplomas and money prizes, will be granted to exhibitors.

STEEL GODOWNS.—The Standard Oil Co., of New York, has under consideration the erection at the east of Dairen Wharves of one all-steel godown, the same as that already erected, having the dimensions of 200 ft in length, 80 ft in width, and 20 ft in height.

HARBOUR WORKS

HULUTAO HARBOR WORKS.—Official reports indicate that the new harbor works at Hulutao, Manchuria, are progressing favorably. The railway to the harbor from the Peking-Mukden Railway line at Lien-shan is about complete and will greatly facilitate the work. The new harbor will be protected from the sea by a breakwater over a mile long, which can later be extended more than a mile farther. Plans for the portion of the harbour which is to be completed at once provide for the accommodation of 12 large vessels. The depth of water in the harbor limits varies from 18 to 30 feet at low tide. The work will take about six years and involves the expenditure of about $5,000,000 gold.

CHEMULPO DREDGER.—The 800-ton steel dredger purchased in Germany through the Mitsui Co. for $125,000, by the Chemulpo customs authorities, has arrived. It has a propeller on both sides, each of which is moved by four steam boilers. The propellers and a sand pump are put in motion simultaneously, so that the vessel, while steaming, may pump up sand and mud. The suction pump has power to suck up sand lying 30 feet below the vessel. In a quarter of an hour the vessel can remove about 1,000 tons of sand and mud.

SINGAPORE NEW HARBOUR SCHEME.—The construction of an unbroken sea wall from Johnston's Pier to Tanjong Pagar in the Singapore Harbor has been abandoned. Until recently the work was rapidly proceeding at both ends, but when the walls had been brought to within 1,000 feet of each other it was found impossible to make the sections meet on account of lack of foundation for structural work. Accordingly, the present gap in the wall will be used as an entrance for a new inner harbor, which will provide a fairway measuring 880 feet across, and will be about 20 acres in extent. It is intended that this harbor be used for small craft. This change of plan completely upsets the Government's scheme of reclamation.

JAVA.—The artificial harbor of Tanjong Priok, the port of Batavia, excavated and constructed some years ago at great cost, is proving inadequate and is to be doubled in extent. Many new buildings have been erected or are in course of erection in the commercial part of Batavia.

Sourabaya, the chief commercial city, is having a new dock and harbor and quite a building boom is taking place; large numbers of new warehouses, banks, and residences are in course of construction. In Samarang also the same change is taking place.

HARBOUR WORKS AT SOURABAYA.—It is estimated that the harbour works at Sourabaya, which includes the establishment of a floating dock, will cost 14,000,000 gulden. On the conclusion of the operations it is calculated that the harbour will have some five miles of quays. The growth of this port may be realised when it is stated that the entrances and clearances increased from 2,300,000 tons in 1900 to 4,208,000 tons in 1909.

A harbour for lighters is being built as Samarang, as well as various new railway stations, and the total cost is estimate at 2,400,000 gulden.

At Tandjong Priok quays are being lengthened, the harbor deepened, and a new dock built; a new up to date railway station is also being erected. The cost of the work is estimated at 4,000,000 gulden.

Harbour works at Macassar include the lengthening of quays and the construction of offices and warehouses. The cost is estimated at 2,225,000 gulden.

TOKIO HARBOUR.—A new programme of harbour construction for Tokio has been completed and is now in the hands of the Chief of the River and Harbour Department of the Tokio Municipality. According to the new scheme, says the "Japan Herald" the mouth of the Sumida River is to be included within the harbour limits to facilitate connexion between the harbour and the rivers and creeks in the city. The work is estimated to be completed in twelve years, and the expenditure is estimated at Y. 37,000,000. Work is to be divided into two periods, the first term covering eight years. During the first term the harbour construction programme is to be almost completed and in the second term the construction of docks, reclamation of foreshore and dredging work is to be carried out. The actual amount of capital required is expected to be about Y. 12,000,000 to Y. 13,000,000, as about seventy-four per cent. of the total expenditure may be covered by the sale of reclaimed ground.

BAIS PORT IMPROVEMENTS.—£ 7,000 has also been allotted to the bureau to complete the port works at Bais. Oriental Negros, making the total cost of the port improvements there £ 67,000. This work is being done by contract by A. E. Ainsworth and rapidly nearing completion. The port of Bais taps a big sugar producing section in Oriental Negros. A causeway is being built from the mainland to the small island of Daco, where a wharf and sugar shed for storing the sugar as it is brought down for shipment are being constructed.

ZAMBOANGA PORT WORKS.—Provincial Engineer Stirling, is completing the plans for the new fill and wharf. Bids will be advertised for shortly.

PEARL HARBOUR.—By midsummer or early autumn it is expected that the work of constructing the approaches to Pearl Harbour will be completed, and then the United States will have in the Pacific a national defence as important and as impregnable as that of Great Britain at Gibraltar. When completed, the work will have cost about $10,000,000. The channel leading into the harbour already has been cut to a depth of thirty feet below low tide, and thus will pass some of the cruisers of the Pacific station. But the cutting is to continue until there will be enough water to float the greatest of the Dreadnoughts.

Pearl Harbour is to be the most strongly fortified naval base in the Pacific, if not in the whole world. The harbour is land-locked. When the channels to the east, the middle and the west locks have been dredged, the harbour will be large enough to float the combined navies of the world. The work of construction has been under way for more than twelve years, and it was hastened materially after the Spanish War and the occupation by the United States of the Philippine Islands.

Hidden forts and disappearing guns of the latest pattern are to protect the new harbour. The guns will use smokeless powder so as to render their discovery by an enemy more unlikely than otherwise would be the case.

THE KEIHIN CANAL.—The Keihin Canal Company has for its primary object the excavation of a canal between Tokyo and Yokohama with a view, on the one hand, to the removal of inconvenience arising from the suspension of shipping services hitherto often experienced, due to the dangers attendant on navigation, and, on the other, the promotion of economic interests by the quick transport of goods between the two cities at a comparatively low cost. For convenience the scheme is spread over two terms. In the first term the Company has decided to appropriate five million *yen* for the construction of a canal between Haneda in the suburbs of Tokyo and Machida in Kanagawa prefecture, of a depth of 40 to 84 feet and a width of 114 to 132 feet.

It is estimated that some ninety per cent. of the gross tonnage of goods between Tokyo and Yokohama is transported by water. Assuming the greater part of those freights to be conveyed through the canal, the Company is confident that the profits arising from the enterprise will be by no mean small, even if the freight rates be reduced to a minimum, in view of the income accruable from attendant business, such as warehouses along the canal, etc. Under these circumstances there are reasons to believe that it will not be long after the completion of the canal, before the Company is able to declare a dividend of at least ten per cent.

HARBOUR WORKS IN THE HOKKAIDO.—H. M. Vice-Consul at Hakodate (Mr. E. L. S. Gordon) has furnished the following information regarding harbour works in the Hokkaido:—

Otaru.—A beginning is to be made this financial year (1912) with the second portion of the Otaru Harbour scheme, which consists of the reclamation of the foreshore between Wakatakecho and Minato Machi, some six acres in extent, and the construction of a pier. The Kumausu tunnel will be done away with as part of the Otaru Municipality Harbour scheme, thereby improving the communication between Otaru and Hariusu.

Hakodate.—It is reported that the passenger pier is to be widened to twice its present width, and nearly one acre of land reclaimed between the pier and the station for the handling of cargo. The Governor-General of the Hokkaido has assented to the commencement this financial year of the widening of the pier and the reclamation of nearly half an acre of land. In addition to the above, a line is to be laid along the pier, and good sidings on the sea front of the station.

Muroran.—It is expected that 9 per cent. of the reclamation work on the west side of the harbour, which was begun last year, will be finished this financial year, and the whole work completed next year. An area of 1⅓ acres will be set apart for timber. Railway lines are to be laid along the sea front as at Otaru and Hakodate.

DAIREN HARBOUR WORKS.—The east quay of Dairen wharves, 1,450 feet long, and the east breakwater projecting therefrom have been completed, and the quay has 30 feet of water. A signal station is being constructed close to the lighthouse. The reconstruction of the main (west) quay into a vertical facing in concrete will be accomplished by the spring of 1913. Then the east side of west quay will be reconstructed.

The berthing capacity of the quay line is 5 steamers of 10,000 tons each, 4 more of 6,000 to 8,000 tons each, 3 of 4,000 tons each, and 10 others of 100 tons up to 3,000 tons each, making the total of 22 vessels at a time. So for the cargo-working record for a single day consisted in loading 9,584 tons general cargo and 2,400 tons of coal and discharging 3,293 tons of general cargo.

With the extension of the quay line, including new berths for steamers of larger type and the improvement of cargo-working equipments, the daily average of 10,000 tons for cargo work lies within easy reach, if only the goods to be loaded into steamers are conveniently placed and the manœuvering of vessels is conducted properly.

NEW PORT SAKHALIN.—According to information from Sakhalin, English capitalists intend to build a port on that island, and for this purpose it is planned to form a Russian stock company.

KUALA KABU F.M.S. Messrs. D. G. Robertson, Ltd., have got the contract for the supply and erection of the engine and dredging plant for the Kuala Kubu river. The plant is expected to be in working order before the end of April.

NEW U. S. COALING STATION.—It is reported from Washington that a new coaling station is about to be established at Kiska Island, the most westerly of the Aleutian group. This news comes following the announcement that the coaling station at Sitka is to abandoned. The new station is a thousand miles nearer Japan than is Honolulu.

NEW DRYDOCK NEAR OSAKA.—Negotiations are in progress for the acquisition by the Kawasaki Dockyard Company of 100,000 tsubo of land at Amagasaki, near Osaka, for the construction of a large dry dock.

WATERWORKS, IRRIGATION

BANGKOK WATERWORKS.—Steady progress is being maintained with the work Messrs. Howarth Erskine, Ltd., have in hand paving the way for Bangkok's water supply. About four kilometres of the smaller pipes have now been put down in the Dusit and Samsen districts, and the laying of the main pipe, 700 millimetres in diameter, has been started at Samsen. The construction of the filter buildings has also recently been commenced.

Tenders were opened in April for the construction of a filtered water reservoir and settling tanks, and were as follows:—

FILTERED WATER RESERVOIR.

	Tender Tcs.	Time of Completing
A. Scanzoni	102,200	10 months
Howarth Erskine, Ltd.,	138,500	12 ,,
G. Kluzer	140,200	12 ,,
Bangkok Dock Co.	143,850	14 ,,
Brossard and Mopin	200,000	18 ,,

SETTLING TANKS.

	Tender Tcs.	Time of Completing
A. Scanzoni	79,400	10 months
Howarth Erskine, Ltd.,	95,800	12 ,,
G. Kluzer	101,000	12 ,,
Bangkok Dock Co.	105,050	14 ,,
Brossard and Mopin	140,000	18 ,,

Messrs. Brossard and Mopin tendered only for the complete work at Tcs. 340,000.

VLADIVOSTOK WATERWORKS:—About two years ago a representative of a New York firm tendered for waterworks and electric tramway contracts and concessions in Vladivostok. The negotiations were not successful, owing to strong opposition to the proposals and to the fact that the term of office of the old town council was about to end. The council elected in 1910 was not in office long enough to negotiate these undertakings, as the election was cancelled and a new one ordered. The council of 1910 decided the contract for the tram line on the main street, which contract was given to local capitalists.

Now a new council has taken office and it is a proper time to reopen negotiations for the waterworks and the second system of trams. There will probably be an expenditure of $2,500,000 to $3,000,000 for waterworks. A plan which includes piping water to the city for about 25 miles has been worked out by a Swedish engineer and will probably be placed before contractors. Preparations for negotiations are being made. It is probable that $500,000 will soon be expended in extending the tram line system.

WATERWORKS FOR PESCADORES.—The Government of Formosa is planning to construct waterworks in Boko of the Pescadores. The islands have a poor supply of water. The naval station is located at Bolo.

India, Irrigating Canals.—One result of the re-partition of Bengal will be to leave the new Presidency of Bengal with two large irrigation canals which do not pay. These are the Midnapore and the Hijili tidal canals. According to the canal revenue report for the triennial period ended March 31, 1911, the capital outlay on the Midnapore Canal was $2,832,326, the average annual receipts for three years were $64,783, and the average annual expenditure $72,270; the Hijili Canal cost $871,439, the annual maintenance charge was $20,350, and the receipts $18,350. The Sone and the Orissa Canals, which go to the new Province, are productive works in the true sense of the term, as they yielded an average annual profit of $583,320 during the last three years.

India, Upper Jhelum Canal Works:—Good progress is being made with the Upper Jhelum Canal, which, begun more than seven years ago, is one of the three sections of the great triple canal project being carried out in the Punjab. The main purpose is to enable the Upper Chenab and Lower Bori Doab Canals to supply water in the winter months to a large tract of arid country in the Sialkot, Gujranwala, Lahore, Multan, and Montgomery districts. The canal will also incidentally irrigate some 300,000 acres in the Gujerat district.

The canal which has a length of 88 miles, takes off from the left bank of the Jhelum at Fort Mangla, the point where the river emerges from the Himalayas. The path of the canal has to be cut through the lower hills to a depth of over 100 feet. As it crosses the natural watershed of the outer Himalayas and cuts through the northern slopes of the low hills known as the Gujeral Pabhis, it encounters numerous torrents with sandy beds and deep slopes. During the greater part of the year the beds are dry, but during the monsoon they are filled with raging masses of water. This feature of the country has necessitated high embankments, deep cuts, and many large drainage works. On the southern slopes of the Pabhis the torrents are deltaic in formation. It is calculated that the total discharge of all the torrents if they flowed simultaneously would be about 614,000 cubic feet a second, but fortunately they are not in flood together, and usually each is in flood only for a few hours at a time.

The 3 miles of cutting at the headworks at Mangla is the heaviest part of the undertaking, and excavations are carried on night and day. A light tramway being found inadequate, a broad-gauge plant is being put down, with 6 steam navvies, a like number of tank engines, between 300 and 400 tip-wagons of 15 cubic yards capacity, 15 miles of broad-gauge track, and about forty 1,000-candlepower lamps, with telephonic and telegraphic plant. Work has been in progress on the cutting since the beginning of last year, and since January there have been continuous night and day shifts. Apart from this cutting, which will not be finished until the autumn of next year, the channel excavations will aggregate a total of 780,000,000 cubic feet. Most of it is in light soil, and consists of deep cuts with long embankments, necessitating the employment of many miles of tramway track, the lead out frequently being as much as three-quarters of a mile long. These long embankments could not be safely erected until the works required to pass the torrent discharges had been constructed. The cost of the channel excavations alone is estimated at £440,000 ($2,141,260).

Siberia, Drainage Machinery.—At the request of the governor general of the Priamur district, the Department of Domains has appointed Engineer Stakle, chief of the hydrotechnical branch of the Amur Expedition, to visit the United States to observe the latest American methods of reclaiming swamps and the machinery and outfits used for this purpose.

Swatow Waterworks:—During 1910 work was started on the local waterworks system. Leigh and Orange, of Hongkong, are the consulting engineers for the buildings, and MacDonald & Co., also of Hongkong, are the contracting engineers. The water will be taken from the River Han about 10 miles above Swatow. The pumping and filtering plant will be at the intake and will consist of four settling tanks, each of 1,200,000 gallons capacity, four filter beds, each of 260,000 gallons capacity one covered-in service reservoir of 800,000 gallons capacity, and the engines, boilers, and pumps. The main from the intake station to Swatow will be a 12-in. cast-iron pipe, about 6¾ miles long, and the quantity of water delivered at Swatow 3.33 cubic feet per second. At Swatow will be a water tower from which the street mains will be supplied, The cost of the work is estimated at $325,500 gold.

Work Begun on the Cauvery River Dam, India.—Work has practically begun on the Cauvery River Dam about 9 miles above Seringapatam. This dam is to keep up the flow of water in seasons of deficient rainfall and to irrigate an enormous tract of land now lying uncultivated between the French Rocks and Chennapatna. It is estimated that 10,000 coolies will be employed. The enterprise is to be carried out departmentally.

The headquarters' establishment will be on the site of the dam, the superintending force consisting of a superintending engineer, three executive engineers, and seven assistant engineers. Comfortable residences and offices will be built on the spot for this force of engineers and other officials connected with the work. Cottages will be erected for the accommodation of the laborers and will be under strict sanitary control. There will be a hospital and schools, and an effort will be made to run the whole business, so far as labor employed is concerned, on the plan that has been followed in the construction of the Panama Canal.

The machinery works for mortar mills and stone dressing will be run by oil, gas, or electric power, comparative estimates for which have been called for.

The railway station nearest the works adjoins Seringapatam, on the Coorg Road, and will presently become a busy center for the discharge of materials. The bowlders are to be had at the site, and lime is being collected in thousands of tons from the adjoining fields of French Rocks and Mandya.

American engineers have had so much to do with engineering works in Mysore State that it is altogether likely that American machinery and American influence will play considerable part in the construction of this great dam and in the distribution and use of water after it has been accumulated. The splendid opportunities of this kind to be taken advantage of in India require competent engineers on the spot.

The Bangalore Tramway Project.—At present about 200 horsepower of the current from the Cauvery Falls is available for the electrification of the Bangalore tramway, upon which work has begun. When the reservoir is complete the available power will be about 5,000 horsepower more. Work on the tramway is in charge of Mr. Beames, the Chief Electrical Engineer in Mysore.

The survey indicates that about 10 miles of the line will be laid from Besvangudi, south of the fort, to Frasertown, in the north of the civil and military station, with a branch from the city to the Malleswaram extension.

The Indian Irrigation Program:—In the financial statement of Sir Fleetwood Wilson for the ensuing fiscal year, information was given as to the irrigatian schemes sanctioned or awaiting approval. It was stated that, in addition to canals in operation, there are altogether 55 projects under construction, awaiting sanction, or being examined by the professional advisers of the Government of India. They include 26 works classed as "productive" and 23 classed as "protective," and are designed to irrigate 8.80 million and 1.18 million acres, respectively, at a total capital cost of a $150,000,000 for the productive and $31,600,000 for the protective works. The former are estimated to yield a net return of 7.28 per cent on the capital. Satisfactory progress is being made with the greatest undertaking now in progress the triple canal project in the Punjab; and Sir Fleetwood Wilson announced that the Upper Chenab Canal will be opened in May or at latest October, while the Upper Jhelum and Lower Bari Doab Canals will be ready in 1914. [Details of this construction appeared in Daily Consular and Trade Reports for Jan. 12 and Oct. 7, 1907, and Apr. 3, 1912.]

It was announced that the Ghaggar, Twante, Mahanadi, and Wainganga Canals have been sanctioned. The scheme for the first of these projects was submitted by the United Provinces Government, and the cost is estimated at under $1,215,000. The Twante project is for a navigation canal along an important trade route in Lower Burma, to cost $2,362,000. The Mahanadi and Weinganga canals will take off from those rivers in the Central Provinces, where at present State irrigation works are almost nonexistent. Their estimated cost is $4,455,000.

The Government of India now have before them the detailed scheme for the introduction of perennial irrigation in Sind, of which the Sukkur Burrage will be the pivot, though the main outlay will be for the Rohri Left Bank Canal. Between them these works will cost not far short of $21,900,000. The Cauvery Reservoir project [described in Daily Consular and Trade Reports for Jan. 25 and Dec. 28, 1911], estimated to cost $12,500,000, is for the construction of an immense dam attaining a maximum height of 201 feet and an average height of 113 feet. It will impound sufficient water to irrigate 4,750,000 acres, and will bring into existence a vast artificial lake having an area of 58 square miles. Another most important scheme on the list for the near future is the Sarda-Ganges-Jumna feeder project. It is estimated to irrigate over 1,500,000 acres, when account is taken of the additional supplies which existing works in northern India will derive from it.

NEW COMPANIES

The Bulletin Publishing Company has been incorporated.

The incorporators are Wm. H. Anderson, Chas. S. Derham, Wm. Crozier, A. R. Tuohy, and Carson Taylor. The capital stock is £100,000.

Mr. F. L. Wilson, Treasurer of the Moro Province. has submitted his resignation from the government service, effective May 1st, 1912, and with Mr. Guy Holland will engage in the lumber business at Kolambugan, Pangil Bay, north coast of Mindanao.

The Kolambugan Lumber and Development Co. is in process of organization. It will have an authorized capitalization of £150,000, of which £100,000 will be paid in. Mr. Holland is president of the company and will have charge of the mill operations, while Mr. Wilson is secretary-treasurer and will take charge of the business end of the proposition. Mr. Holland had already established a sawmill at Kolambugan, which is now merged into the company.

The company will begin sawing about May 1st. The mill has a capacity at present of twenty-five thousand board feet of lumber per day, which it is the intention to increase to fifty thousand as soon as the necessary, machinery can be imported. Their concession is said to be the best in Mindanao with heavy stands of hardwoods. In fact the concession contains a large stand of pure molave which is readily accessible to the mill.

The Eastern Lumber Company, a newly organized concern, has shipped a complete logging outfit, to Sibuyan an island situated between Mindoro and Romblon, and will begin milling operations as soon as the machinery has been put up.

Milling machinery was shipped to Sibuyan by the same company some time ago, and the logging outfit followed on the Maritima steamer

Belgika which left Manila a few days ago. A logging engine, a 45 h. p. boiler and about 6000 feet of cable were shipped on Belgika.

The island of Sibuyan comprises an area of 171 square miles, and practically the whole island is densely timbered. There is enough timber to keep a saw mill going for 200 years. The principal woods of Sibuyan are apitong, tanguile, camigon and narra, while red and white lauan are found in smaller quantities.

The Eastern Lumber Company was incorporated recently by J. W. Holland (president), Calvin Horr (vice-president), D. N. Hanna (secretary-treasurer), Perry McKown, and G. W. Walker. The Manila office is at 1353 Calle Anloague.

The Philippines Engineering and Machinery Company.—Has been organized and incorporated with a capital of £100,000 to introduce modern machinery throughout the islands.

The new company is composed entirely of Filipinos who believe in the future prosperity of the islands and who will make a specially of introducing modern farming machinery as well as machinery for other purposes, such as sugar mills, sawmills and electrical machinery for the provincial municipalities.

The object of the company as set forth is to import all classes or modern machinery, agricultural; maritime, electrical and stationary engines, to buy and sell and engage in a general machinery business.

The new company starts off with a capital of £100,000, divided into 4,000 shares with a par value of £25 each, with main offices in Manila. The directors of the company are Don Ramon Irureta Goyena, Don Joaquin Garcia Lopez, Don Elias Zaragoza, Don Vicente Marasigan, Don Juan C. Arenas, Don Juan Codina Sinio and Don Antonio de la Riva.

The Inter-Island Express Company, has been incorporated under the insular corporation laws with a capital of £150,000, divided into 1,500 shares with a par value of £100 each.

It is the object of the company to carry on a general brokerage and transportation business, for the clearance and shipment of goods, to act as forwarding agents, receiving and shipping goods for themselves and acting as agents, for others, and to conduct a general ticket office for the sale of passenger tickets to all points in the Philippine Islands and elsewhere, with main offices in Manila.

The directors of the company are Messrs. B. W. Rice, F. J. Perrine, G. B. Wicks, H. B. Pond, J. E. McClelland, J. B. Lewels, and F. K. Schnitzler.

The Philippine Export and Import Company has been incorporated with a capital of £250000.

The stock of the company is divided into 2,500 shares at a par value of £100 each, 500 shares to be designated as "preferred stock" and the balance as common stock.

The Company will engage in a general merchandise and commission business throughout the Philippine Islands.

The directors of the company are Messrs. E. M. Loffler, S. M. Berger, D. Latimer, Sydney Schwarzkopf and W. Breaker. Mr. Schwarzkopf has been elected treasurer of the new company.

Ragay Gulf Lumber Co.—A new lumbering enterprise is in the field and has obtained a forest concession comprising an area of 450 square miles on the shores of Ragay gulf. An up-to-date logging outfit and sawmill machinery will be ordered at once from the United States, and operations will be begun as soon as the machinery arrives and is installed.

The undertaking is financed by E. J. Lane, of Seattle, and R. O. Russell and M. A. McLaughlin, of Salem, Oregon.

A branch of the American Trading Company has been opened in the old McCullough building Manila and will be managed by J. H. Allison.

COMMERCIAL

Tea Movement.—Owing to the unsettled conditions in Shanghai and Chefoo caused by the revolution, this season's tea from Hankow, amounting to over 322,580 tons, was forwarded to Russia over the old caravan route, Urga to Kiakhta, instead of via Vladivostok as in former years.

Timber Prices.—Owing to the strong demand in Vladivostok for timber, many contracts for the export of timber have been canceled. Sawn timber, 40 per cent cedar and 60 per cent fir, is selling at 30 cents per cubic foot.

Rebate Reduction on German Steel Exports.—With regard to the rebate granted by the German Coal Syndicate, the syndicate has decided that the rebate of 1½ marks (35.7 cents) per ton of coal, purchased from it for the purpose of working up iron goods manufactured from material bought from the Essen Pig Iron Syndicate and eventually exported, shall be abolished as from June 30, 1912.

Referring to the announcements which have appeared recently in the press, the German Steel Works Syndicate allows a rebate of 15 marks ($3.57) per ton only to firms (non-members of the syndicate) who buy their steel goods from the syndicate, and only if proof is given that the goods are eventually exported. The steel works syndicate does not pay any bounty to its own members, as all its members' produce is sold through the Dusseldorf Steel Works Syndicate, but only allows a rebate to non-members, comprising a few "pure" rolling mills, which do not produce the steel themselves, but are obliged to buy it from the steel works syndicate. The above-mentioned rebate of 15 marks is to be shortly reduced to 10 marks ($2.38) or less per ton, and is eventually to be abolished. Over 90 per cent of all the German iron and steel works are members of the steel works syndicate. The number of "pure" works—i. e., "pure" rolling mills or "pure" black furnaces, are getting very scarce. Amalgamations of coal-mining companies, iron-ore companies, blast furnaces, rolling mills, and steel works are the order of the day; there are plenty of firms who own iron or coal fields and also blast furnaces or steel works. These firms have the advantage of cheap coal—producing it themselves—and are also members of the steel works syndicate. Whereas, formerly, works endeavoured to increase their dividends by increasing their turnovers, nowadays firms increase their dividends by amalgamating or by producing all their raw material. The "pure" works are the exception and the "mixed" works are the rule at the present time. (C.R.)

Russian Steel Bar Syndicate.—From information received it appears that two of the members have withdrawn from the Russian Steel Bar Syndicate, which is a subsidiary of the Russian Iron and Steel Syndicate, better known as Prodamet. The membership of the bar syndicate is now 25, and as a consequence of the readjustment of the allotments those of the Dnieprovienne, the Russo-Belge, the Novorossisk, and the Kramatarskaja have been increased, the increases in the case of the first three at least being justified by considerable extensions of plant. On the other hand, the combined allotments of the Donetz-Yourievka, the Ural-Volga, and the St. Petersburg Rolling Mills Co. have been reduced to the extent of 1 per cent.

Diesel-Engine Combine.—It is reported that an amalgamation is contemplated between the Diesel Engine Co.; Carels Bros., a Belgian undertaking that manufactures Diesel engines; and Davey Paxton & Co., of Colchester. The capital of the combined undertaking is placed at £750,000 ($3,650,000), of which between £400,000 ($1,947,000) and £500,000 ($2,433,000) may be publicly issued, and the balance held in reserve. Considerable developments are reported in connection with the Diesel engine, and this amalgamation is probably for the purpose of assisting these. The system of giving other firms a license to manufacture Diesel engines, however, has proved successful and is not to be discontinued.

Railway Economies in Coal.—The greater attention given by British locomotive engineers to the superheating of locomotives, with consequent economies in coal consumption ranging up to 20 per cent, has led to a great improvement and simplification of earlier designs. Foreign types of superheaters have been used, but there is said to be a growing disposition among British railway engineers to employ their own designs. The Robinson tube superheater, the invention of the chief mechanical engineer of the Great Central Co., has given satisfactory results. Although it has been in use for only a few months, nearly 200 Great Central engines already are being equipped with it. It is also being adopted by the Great Northern, North Eastern, Caledonian, South Eastern & Chatham, Tilbury, and other railway companies.

Western Electric Booklet.—There are to-day many business men who unfortunately for themselves, are doing without many things which would enable them to work in greater comfort and, in general, conduct their business with increased efficiency. That such a state of affairs exists is not the fault of the business men but rather due to the fact that they have not been told in the right way. Realizing this, the Western Electric Company has recently published an attractive little book aptly named "The Silent Partners—A true Story" The book, written in an easy, colloquial style, is so convincing that the reader wants to invest in everything described therein. The advantages of Western Electric Inter-phones as time and step savers; of desk, bracket, ceiling and counter fans as creators of coolness; of ventilating or exhaust fans as fresh air producers and of large and small motors for shop and factory use, are set forth cleverly.

During the past decade, the public has come to accept the telephone as an every day sort of thing, good for talking to some one else miles away; but owing to the familiarity which such continued speaking acquaintance has bred, has probably never given a thought to the delicate workmanship necessary to turn out a transmitter which really talk well.

The transmitter, which is found on the great majority of telephones, is made up of fifty-nine details or parts, not including over fifty thousand granules of carbon, which are encased in a closed cup and form what might be termed the "dynamo" of the instrument. Each detail of the transmitter is made as carefully as the most delicate part of an expensive watch. The average person, rarely dealing with dimensions less than one-eighth of an inch, will scarcely realize what it means to manufacture very small parts whose dimensions must not vary more than one-thousandth (1/1000) of an inch either way. The outside of the transmitter is compact appearing and strongly built. This is necessary on account of the fact that it is the housing for the "details made with wondrous skill."

Through the medium of these delicately manufactured Western Electric instruments, it is now possible to transmit speech from New York to Denver, a distance 2050 miles. Less carefully made transmitters would fail utterly in such a project. In a short time the line will be extended to San Francisco, when, if the hopes of the telephone engineers, who are engaged in the work, are realized the dream of trans-continental telephone communication will have come true.

Timber Shipment.—Two cargoes of Manchurian and Ussuri (Siberian) timber were shipped from Vladivostock to England during December. Fifty carloads of ash veneer were included.

Cheap Meat.—The peasants of western Siberia, owing to the poor hay crop, are compelled to dispose of their cattle, and beef in Kurgan and other places is being offered at 2.2 rubles per pood (about 3 cents per pound).

The Russian Flour Milling Co., Vladivostok, has contracted for 1,083 tons of Australian wheat, at 60 cents per pood (36.112 pounds), c. i. f. Vladivostok.

Fiber Hats.—The first direct shipment of Formosan fiber hats to the United States has been made. The Formosan hats resemble the Panama hat, but are produced more cheaply. They are export to America and other countries in large quantities via Japan. The total export of these hats to Japan and other countries during the last year amounted to over 1,000,000, valued at $800,000.

Opium, Formosa.—The total income derived from the Government Opium Monopoly for the fiscal year ending March 31, 1912, is estimated at $2,500,000, against $2,400,000 the preceding year. This increase, it is declared, does not refute the claim that the number of opium smokers is decreasing annually. The increment of revenue arises from the advancing of the price of opium and from the preference shown by consumers to superior quality of opium paste. The total number of licensed smokers is 86,282 Formosan men and 12,705 women.

Salt, Formosa.—The first shipment of salt from Formosa to the Philippines was made last December by the Mitsui Bussan Kaisha. Its value was $1,174. The estimate of salt to be exported from Formosa the next fiscal year, April, 1912, to March, 1913, is to Japan, 90,000,000 pounds; to Chosen (Korea), 17,000,000 pounds; to Asiatic Russia, 25,000,000 pounds; and to Karafuto 5,000,000 pounds. The manufacture of salt is from sea water evaporation, and the growing enterprise is one of the four Government monopolies.

Wheat Sales.—Due to the high price of wheat in Manchuria and the short crop, local flour-mill owners, who also own mills in the Russian Maritime Province, have purchased Austrian wheat for their Siberian mills to the extent of about 3,500 tons. The prices paid are a trifle higher than the current Manchurian price, but they fear that heavy purchases in Manchuria would cause a shortage of wheat for the Harbin mills, in addition to raising the local price to such a point that it would be necessary to close the mills.

Due to the high price of Manchurian wheat, American flour is now being sold as far north as Kuanchengtzu, and it is confidently predicted that it will soon be on sale in Harbin and will be able to successfully compete with flour from the local mills. As in the case of American cotton goods, this is due entirely to exceptionally favorable conditions and gives no guaranty of the permanency of the sale of American flour in this market.

Horse Breeding in China.—The Chinese Government has taken up the matter of breeding horse for general purposes and particularly for cavalry mounts. It is understood that the breeds introduced from Europe some time ago have not led to the desired improvement in the native animals. There are two strains of horses in northern China, the Monogolian, a small-sized but very vigorous animal, and the Ilian, a tall handsome horse much resembling its Arab and Persian relatives. It is thought that a proper crossing of these breeds will secure the desired strain.

The Government Veterinary College at Paoting affords instruction to a large number of students, 180 vacant places being open to matriculation annually. From lack of care, bad feeding, little or no scientific breeding, and a lack of trained caretakers for even the best animals, horses in China have come to be of little value for any purpose. Improved cattle and horse breeding are essential to modern agricultural development in China.

PLANTATIONS

Formosa.—About 20 Japanese business man have organized the Taiwan Norin Kabushika Kaisha, capital $250,000, to raise rubber on 3,600 acres given it by the Formosan Government. The company will also grow bananas, pineapples, and sugar cane for profit until the rubber trees are tapable. Many people appear anxious to raise rubber in Formosa, and seeds from the Malayan Islands have been distributed for experimental growth.

Although Government cotton-growing experiments in Formosa have not been encouraging, the Taiwan Menka Saibai Kumiai (Formosa Cotton Cultivation Association) has been organized to raise cotton experimentally in the central and southern parts of the island.

Camphor-tree afforestation is carefully nurtured by the Government, which in March distributed 3,855,552 young trees for this year's plantings.

Twenty thousand pineapple plants arrived yesterday on the steamer Bellerophon from Singapore for the Luzon Pineapple Plantation Company, and 80,000 more plants are on the way, also from Singapore, for the same company.

This total of 100,000 plants will be planted on the Luzon Pineapple Company's plantation in Nueva Ecija. This is the first attempt at cultivating pineapples on a large scale in the Philippine Islands.

Tea and Orange Growing.—The tea industry in central Formosa will be increased at the expense of the sugar industry. Already farmers who have been growing sugar cane are turning to tea culture. The special reason for this change is the high price of tea this season and the low price of sugar cane. The teas of this locality (Horisha) produced 186,000 pounds during the spring and summer of 1911.

The cultivation of oranges in north and central Formosa is becoming an industry of increasing importance. Plantations, both subsidized and unsubsidized, are flourishing, and the value of the crop this season is $153,813. In 1907 the value was only $84,094.

S. M. Railway Agricultural Program.—The following horticultural and agricultural work is planned for 1912, along the South Manchuria Railway area:

Saplings will be distributed to the principal stations, chiefly for hedge plants, shade trees, and improvement of appearance. Should the company's nursery at Hsiungyocheng lack a sufficient supply, the shortage will be supplied from other sources.

Growing the mulberry tree is to be taken up in earnest. Both the climate and soil of south Manchuria encourage sericulture. Should the initial undertaking at Dalny prosper, tree plantings will be extended northward.

Young fruit trees will be distributed to railway employees along the lines for planting about their residences, to encourage a taste for horticulture and to experiment in orcharding.

Experiments in rice farming have been made at Mukden, Hsiungyocheng, Chienchinchai, and other places with fair results at each place. Haichong, Liaoyang, Tiehling, and the country along the Mukden-Antung line are also pronounced to be well suited to rice farming. Several new places will be tapped this year and the railway company is prepared to offer sundry facilities in the lease of lands, irrigation, etc., where necessary. For instance, wells may be bored at the company's expense if it considers such help fully justified.

A notification has been issued to the effect that all applications for information on any of the foregoing subjects should be sent to the company's district agents at the various centers.

Tenders for Steel Coal Vessel.—The Quartermasters Department, Philippine Island, will open tenders on June 15, for a steel coal vessel to carry 6,000 tons coal. The vessel is to be fitted with a tower and the necessary apparatus for weighing coal and discharging it through telescopic tubes into bunkers or elsewhere. She is to be self-trimming and when loaded must not draw more than 18 feet.

The boiler is to be of the Scotch return type built to a factor of safety of 5 for 150 lb. working pressure and sufficiently large to give over 50 per cent. horse-power above the full load with all machinery in operation.

Remarkable Voyage of the "Harpoon II."—A 9,000 mile trip under all conditions of wind and weather in a 23 feet motor boat driven by a 7 H.P. engine is one that would make the most enthusiastic motor boatman think twice before attempting. Such a trip was recently completed, however, by three young men of Jacksonville, Florida, H. A. and H. J. Dillovan and John De Grott, who left that city on May 4, last and voyaged by the "outside pessage" to Montreal calling at practically every city, stream and bay on the eastern coast of the U.S. and Canada.

While the crew called themselves "Marine Hoboes" the name is misleading as they are a fine lot of boys who made the trip for the pure love of sea and accepted everything in the way of work that offered at the different ports of call and this made enough to fill the galley and tanks for the voyage to the next port.

The "Hargoon II" was the tiny craft that safely carried the three pleasure seekers to Montreal and back, and a sturdy little 7 H.P. two cylinder Type "E" Fairbanks-Morse Marine Engine furnished the Kick. A feature of the trip that made it one long to be remembered by the crew was the many courtesies extended them by lovers of the sport. At a number of places they were lavishly entertained while they were made honorary members of many power boat and yacht clubs. Even the Colonial Yacht Club of New York extended memberships to them. All in all the log of the "Harpoon II" with its record of varied and unique adventures spiced with thrilling encounters with wind and wave, would make delightful reading, even for those who have never journeyed down to the sea in boats or never bucked a head sea on a "dusty day."

THE HONGKONG LAW COURTS

On January 15 this year the new Law Courts at Hongkong, illustrations of which appear on this page, were opened by the then Governor, Sir Frederick Lugard, with fitting ceremony.

The old premises in Queen's Road had been in use since 1862 and had long become entirely adequate for the purpose for which they were utilized. The erection of premises more imposing in appearance and more adapted to the growing legal requirements of the colony had often been talked of, but it was not until 1900, that the original estimates were prepared. The foundation stone of the Courts of Justice, as they are now called, was laid a little over eight years ago by Sir Henry Blake. Work in connection with construction was extremely slow and the original estimates were altered and revised to such an extent that it will not be possible to know the actual cost of the courts until the next Budget statement is made in Hongkong.

The building is constructed of granite and over 12,000 tons were used in the structure. The original design provided for another storey, but to save expense the Public Works Department evolved the present roofing—Chinese or Korean. The result is hardly a success from an æsthetic point of view, and the fact that adjacent buildings are much higher detracts from the general appearance. However on the occasion of the formal opening the Chief Justice, Sir Francis Piggott, said that he thought that the great court and even the two lesser courts were among the largest in the British Empire.

The building was erected by Chinese contractors under the supervision of the Public Works Department.